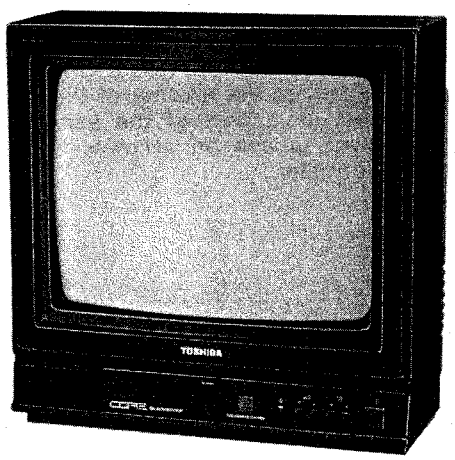
**SERVICE DATA**
**FILE NO. 050-110**
**PAL-B/G**
**SYSTEM**

# TOSHIBA

## COLOUR TELEVISION

# 147R7E




### SPECIFICATIONS

| | |
|---|---|
| Power Input Rating: | 58 watts (normal), AC 175 ~ 270 volts, 50/60Hz |
| Aerial Input Impedance: | 75 ohm unbalanced type for VHF and UHF |
| Receiving Channels: | Any of VHF channels ..... channels 2 to 12<br>Any of UHF channels ..... channels 21 to 69 |
| Intermediate Frequencies: | Picture I-F carrier frequency ..... 38.9MHz<br>Sound I-F carrier frequency ..... 33.4MHz<br>Colour sub-carrier frequency ..... 34.47MHz |
| Chassis Construction: | IC Solid State, Horizontal Chassis |
| Picture Tube: | A34JAN31X01(W) (33.5 cm measured on diagonal of viewable picture area), 90° Deflection |
| Sound Output: | 2.3 watts (at 10% harmonic distortion), Max. 3.0 watts |
| Speaker: | Oval : 6 cm x 7 cm |
| Cabinet: | Plastic portable type |
| Dimension: | Height ..... 36.3 cm<br>Width ..... 37.0 cm<br>Depth ..... 36.2 cm |
| Weight (Net): | 9.3 kg |

Specifications are subject to change without notice.

Printed in Japan Apr. 1988 (So)

# SAFETY INSTRUCTIONS

**WARNING**: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECUATION" , "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" DESCRIBED BELOW.

## X-RAY RADIATION PRECAUTION

1. Excessive high voltage can produce potentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must not be above the specified limit. The nominal value of the high voltage of this receiver is 24.5kV at zero beam current (minimum brightness) under 175 ~ 270V AC power source. The high voltage must not, under any circumstances, exceed 26.5kV.
   Each time a receiver requires servicing, the high voltage should be checked following the HIGH VOLTAGE CHECK procedure in this manual. It is recommended the reading of the high voltage be recorded as a part of the service record. It is important to use an accurate and reliable high voltage meter.
2. The only source of X-RAY RADIATION in this TV receiver is the picture tube. For continued X-RAY RADIATION protection, the replacement tube must be exactly the same type tube as specified in the parts list.
3. Some parts in this receiver have special safety-related characteristics for X-RAY RADIATION protection. For continued safety, parts replacement should be undertaken only after referring to the PRODUCT SAFETY NOTICE below.

## SAFETY PRECAUTION

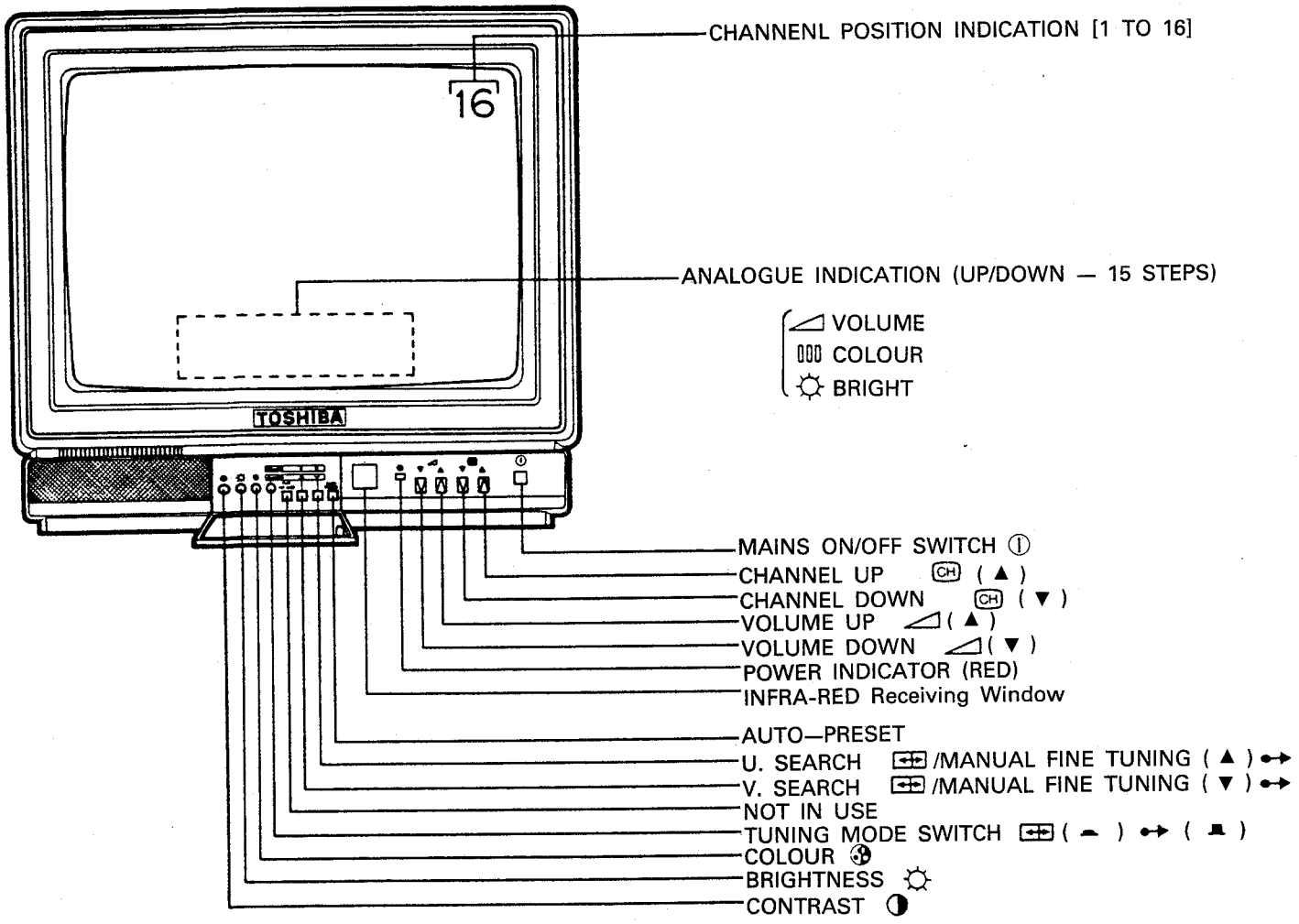
1. Potentials as high as 23,000 volts are present when this receiver is operating. Operation of the receiver outside the cabinet or with back board removed involves a shock hazard from the receiver.
   1. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high-voltage equipment.
   2. Alway discharge the picture tube anode to the receiver chassis to keep off the shock hazard before removing the anode cap.
   3. Perfectly discharge the high potential of the picture tube before handling the tube. The picture tube is highly evacuated and if broken, glass fragments will be violently expelled.
2. If any Fuse in this TV receiver is blown, replace it with the Fuse specified in the specified in the chassis parts list.
3. When replacing parts or circuit boards, wind the lead wires around terminals before soldering.
4. When replacing a high wattage resistor (oxide metal film resistor) in circuit board, keep the resistor 10mm away from circuit board.
5. Keep wires away from high voltage or high temperature components.
6. This receiver can be operated under AC 175 ~ 270 volts, 50/60Hz. NEVER connect to DC supply or any other power.

## PRODUCT SAFETY NOTICE

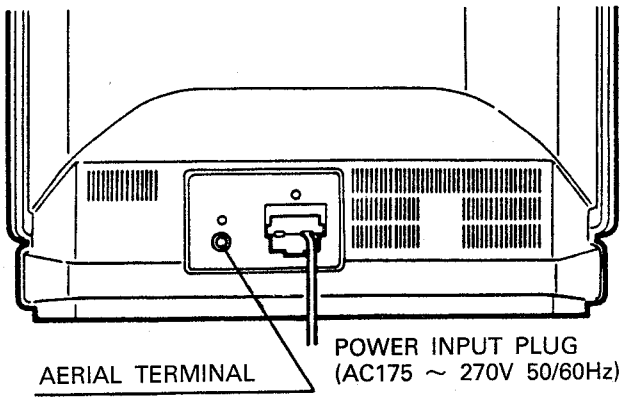
Many electrical and mechanical parts in this chassis have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-RAY RADIATION protection afforded by them cannot necessarily be obtained by using replacement conpoments rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual and its supplements, electrical components having such features are identified by the international hazard symbols on the schematic diagram and the parts list.
Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create X-RAY RADIATION.

# FRONT CONTROLS AND REAR VIEWS

**FRONT VIEW**




**REAR VIEW**



# CONTROL ADJUSTMENT

### TO SWITCH ON THE RECEIVER

Push in the POWER switch. POWER indicator will be illuminated.
Note: If the power stays in standby mode, push the CH ▲ ▼ buttons.

### TO ADJUST VOLUME ( ▲ ▼ )

Keep on pressing the VOLUME UP button for increase in volume.
Keep on pressing the VOLUME DOWN button for decrease in volume.
Release the button at your desired volume level.

### CHANNEL SELECTION AND TUNING ( ▲ ▼ ) CH

You can select your favourite program by the channel selection keys on the remote control hand unit or "CHANNEL UP/DOWN" keys on the front of the receiver.
To enjoy the program which is not preset, set the channel by following procedure.

(1) CHANNEL PRESET PROCEDURE
Select the position to be preset by the Channel Position Button ( ▲ or ▼ ) on the TV set or the remote control hand unit or by the Direct Position Selector on the remote control hand unit.
To select a position from 11 to 16, press either the "1—" button first, and then press one of the buttons from "1" to "6".
For example: 16th position; Press the "1-" and "6" buttons.

(2) SEARCH
a. Push on the tuning mode switch. ( ⇄ (⌒) )
b. Push the VHF SEARCH key.
- When television signal is caught, search operation stops and the channel is memorized automatically.
- During search operation,">>>" is indicated under the position indication.
- When SEARCH gets to the END of VHF, the display">>>" will flash.

c. Push the UHF SEARCH key.
- When television signal is caught, search operation stops and the channel is memorized automatically.
- During search operation,">>>" is indicated under the postion indication.
- When SEARCH gets to the END of UHF, the display">>>" will flash.

(3) MFT (Manual Fine Tuning)
a. Push off the tuning mode switch. ( ⊶ (▲) )
b. Tune the fine picture by MFT button. ( ▲ or ▼ )

### AUTO PRESET

- By pressing the AUTO PRESET button, channel position number and indication">>>"are displayed at the top righthand side of the screen, and then "SEARCH" operation starts.
- Once started, "SEARCH" selects signals presenting on broadoast in sequence from lower channel to higher channel and the receiver set memorises automatically these selected channels storing them one by one into the position one and the subsequent positions.
- With completion of the operation,">>>"disappears. Now "SEARCH" returns to the position one and the channel selected by the position one can be received.

### BRIGHTNESS CONTROL ☼

Adjust the BRIGHTNESS Control for natural brightness if the picture appears too dark or too light. For the best results, adjust the BRIGHTNESS and CONTRAST Controls together, until the picture is clear and sharp.

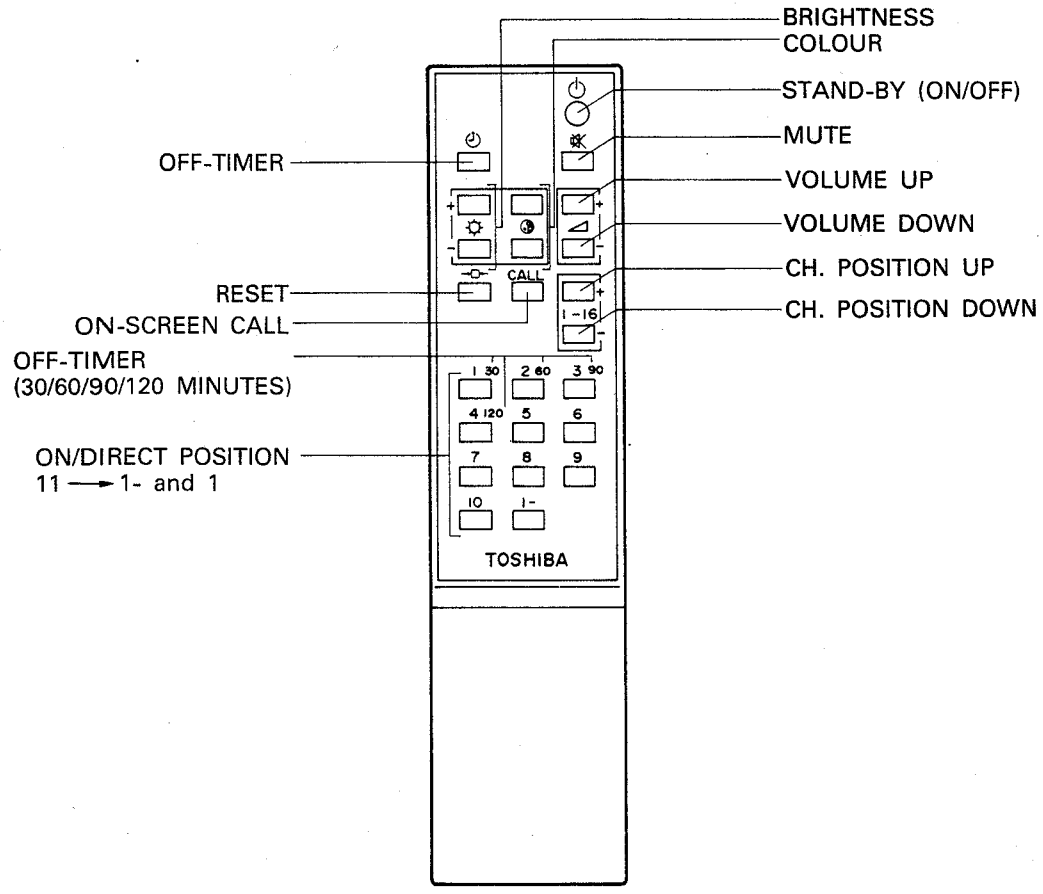
### CONTRAST CONTROL ◑

If the picture does not show desired contrast between light and dark shades, adjust the CONTRAST Control for desired picture quality. A slight readjustment of the BRIGHTNESS Control may also be necessary.

### TO ADJUST COLOUR

After obtaining the best black and white picture, carefully turn the COLOUR Control slowly clockwise.

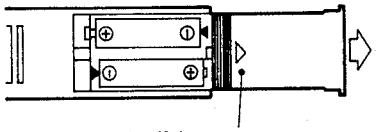
# REMOTE CONTROL HAND UNIT




## Before operating

### INSTALLING THE BATTERIES

1. Remove the battery cover.
2. Insert the two "AA" (pencil size) 1.5V batteries making sure the polarity (+ or − )of the batteries matches the polarity marks inside the unit.
3. Close the battery cover.

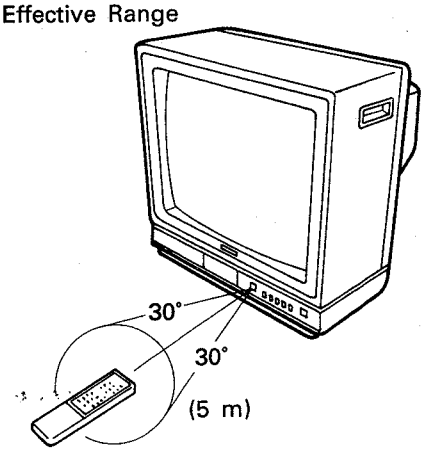


Press and slide to open.

### TIPS FOR REMOTE OPERATION

- If intermittent remote control operation occurs, replace the batteries according to "INTALLING THE BATTERIES."
- The battery life should be about a year under normal use.
- When the Remote Control Hand Unit is not used for a long period of time or when the batteries are worn out, take out the batteries to prevent liquid leak.
- Do not throw the batteries into a fire. Dispose of used batteries in the specified places.
- Take care not to drop, dampen, disassmble the Remote Control Hand Unit.

Effective Range



## REMOTE OPERATION

Before using the Remote Control Hand Unit, push the power switch on the receiver to turn the TV set on.

1. STAND-BY "ON/OFF" Button ( ⏻ )
   To switch on, push the button. To switch off, push the button again.
2. ON/DIRECT POSITION Selector
3. VOLUME UP or DOWN Button ( ◿ )
   [+] Continuous press increases Volume gradually.
   [−] Continuous press decrease Volume gradually.
   Release the button at your desired volume.
4. BRIGHTNESS Button ( ☼ )
   Press the BRIGHTNESS ☼ button.
   [+] Continuous press increases Brightness gradually.
   [−] Continuous press decrease Brightness gradually.
5. COLOUR Button ( ◔ )
   Press the COLOUR ◔ button.
   [+] Continuous press increases Colour gradually.
   [−] Continuous press decrease Colour gradually.

### VOLUME, BRIGHTNESS and COLOUR Adjustment

1. The level control keys ( ▲ or ▼ ) are common to the functions. These keys work only while the selected function is displayed. (for 4 sec.)
2. Above display will disappear if no additional pressing of CONTROL or LEVEL ( ▲ / ▼ ) key is done within 4 seconds.
3. The RESET ( ⇥□⇤ ) key resets the value corresponding to picture control functions, such as VOLUME, BRIGHTNESS and COLOUR, to the value which is returned to the original levels.
4. Adjustment steps and indication
   Each function can be adjusted with 64 steps and it's approx. adjusted value is displayed with 15 steps.

| FUNCTION | ON SCREEN COLOUR BAR DISPLAY | |
|---|---|---|
| | Green segment | |
| | CONTROL DOWN ▼ Button (The green segment moves left) | CONTROL UP ▲ Button (The green segment moves right) |
| VOLUME ◿ | decrease in volume | increase in volume |
| BRIGHT ☼ | Dark | Light |
| COLOUR ▯▯▯ | Pale | Deep |

6. CALL Button
   The selected CHANNEL NUMBER is indicated on the TV screen when the "CALL" button is pressed. The indication disappears by the second press.

7. RESET Button ( ⊣□⊢ )
   By pushing the RESET button, the levels of the colour, the brightness and contrast return to the original levels.

8. MUTE Button ( 🔇 )
   Pushing the button stops the sound temporarily.
   Pushing the button again returns the sound to the volume at which it was set immediately before the muting.
   Use when the telephone rings.

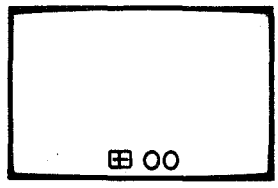
9. OFF-TIMER ( ⏲ )
   OFF-TIMER function is incorporated in new control system. Four kinds of setting time, such as 30, 60, 90 and 120 min., are available and its remaining time before turning off a set can be displayed on the screen.
   OFF-TIMER is only operated with Remote Control Hand Unit.
   For example, if you wish to switch the TV set off after 30 minutes:
   1. Press TIMER ⊕ Button.
      The TIMER mode is displayed on the screen.

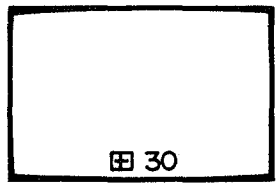
   2. Press " ① 30 " Button.
      " ⏲ 30" will appear on the screen and OFF-TIMER INDICATOR lights up.

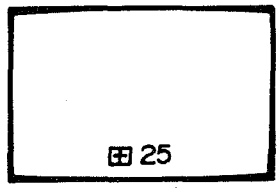
   3. Press TIMER Button again.
      The display of TIMER mode will disappear.

   4. When you want to know the remaining time before turning off a set, press TIMER button. Then the remaining time will show up on the screen.

Note: To cancell the timer operation, ① press TIMER button ② Press RESET button.
Timer operation is also cancelled by turning the power off.



# CHASSIS TOP VIEW

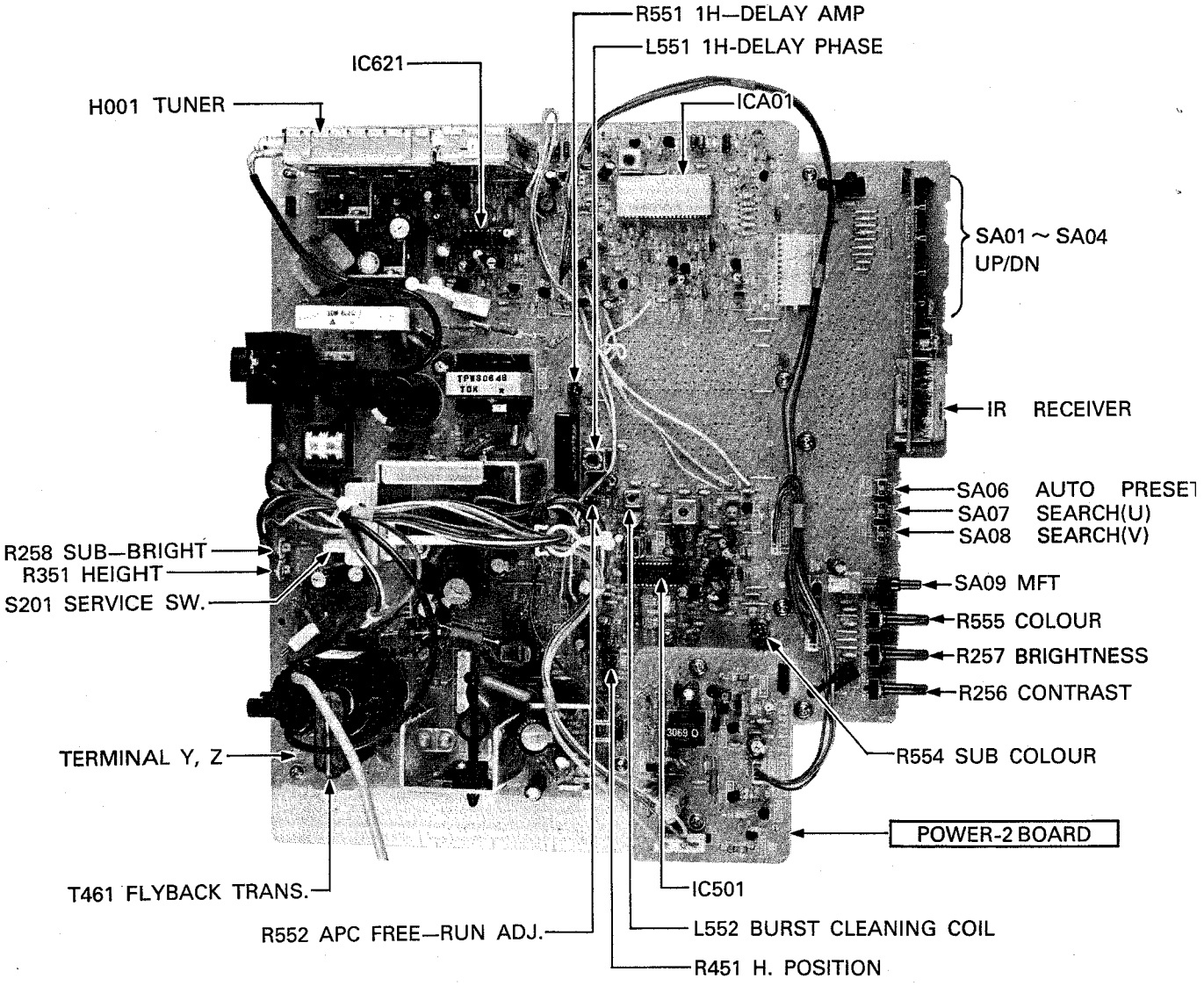



**Figure 1. Chassis Top View**

# CHASSIS REAR VIEW

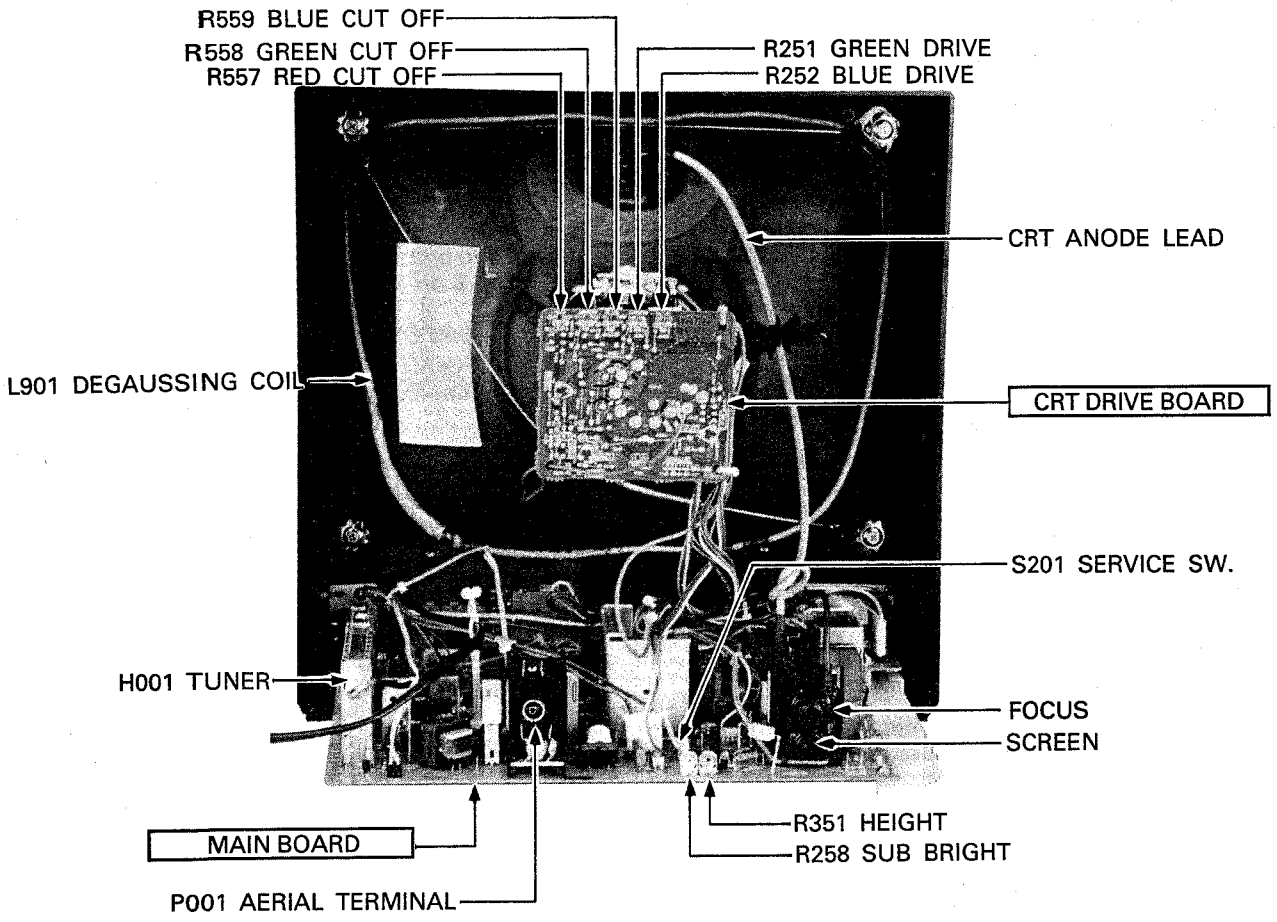



**Figure 2. Chassis Rear View**

**WARNING**: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION" , "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 2 OF THIS MANUAL.

# INSTALLATION AND SERVICE ADJUSTMENTS

## GENERAL INFORMATION

All adjustments are thoroughly checked and corrected when the receiver leaves the factory. Therefore the receiver should operate normally and produce proper colour and B/W pictures upon installation. However, several minor adjustments may be required depending on the particular location in which the receiver is operated.

This receiver is shipped completely in cardboard carton. Carefully draw out the receiver from the carton and remove all packing materials.

Plug the power cord into a convenient 175 ~ 270 VOLTS 50/60Hz AC two pin power outlet.

Turn the receiver ON and adjust the FINE TUNING for best picture detail.

Check and adjust all the customer controls such as BRIGHTNESS, CONTRAST and COLOUR Controls to obtain natural colour or B/W picture.

## AUTOMATIC DEGAUSSING

A degaussing coil is mounted around the picture tube so that external degaussing after moving the receiver is normally unnecessary, providing the receiver is properly degaussed upon installation. The degaussing coil operates for about 1 second after the power to the receiver is switched ON. If the set is moved or faced in a different direction, the power switch must be switched off at least 10 minutes in order that the automatic degaussing circuit operates properly.

Should the chassis or parts of the cabinet become magnetized to cause poor colour purity, use an external degaussing coil. Slowly move the degaussing coil around the faceplate of the picture tube, the sides and front of the receiver and slowly withdraw the coil to a distance of about 2 m before disconnecting it from AC source. If colour shading still persists, perform the COLOUR PURITY ADJUSTMENT and CONVERGENCE ADJUSTMENTS procedures, as mentioned later.

## HIGH VOLTAGE CHECK

CAUTION: There is no HIGH VOLTAGE ADJUSTMENT on this chassis.

1. Connect an accurate high voltage meter to the second anode of the picture tube.
2. Turn on the receiver. Set the BRIGHTNESS and CONTRAST Controls to minimum (zero beam current).
3. Hight voltage will be measured below 26.5 kV.
4. Rotate the BRIGHTNESS Control to both extremes to be sure the high voltage does not exceed the limit of 26.5 kV under any conditions.

## HORIZONTAL POSITION (R451) ADJUSTMENT

If a picture position is horizontally shifted excessively, adjust R451 to place picture in the centre screen.

## HEIGHT ADJUSTMENT

HEIGHT Control (R351) on MAIN Board changes the size of the picture or pattern, having an equal effect on the top and bottom. Make final adjustment to overscan the mask 2 cm at top and bottom.

## FOCUS ADJUSTMENT

Adjust FOCUS Control on FLYBACK TRANS.(T461) for well defined scanning lines in the center area on the screen.

## APC FREE-RUN (R552) ADJUSTMENT

1. Receive a B/W pattern signal.
2. Connect synchro-counter to terminal TP-44.
3. Short terminal TP-43A to terminal TP-43B with a jumper wire.
4. Connect the terminal TP—41 through a capacitor 0.01 $\mu$F to the earth of IC501 with a jumper wire.
5. Adjust R552 for the frequency of 4.433619 MHz on counter.

## SUB COLOUR (R554) ADJUSTMENT

1. Receive PAL Philips pattern signal.
2. Connect synchroscope to terminal TP-46B.
3. Set COLOUR and CONTRAST controls to the maximum, and BRIGHTNESS to the minimum.
4. Adjust R554 for 3.9 Vp-p of B-Y signal on scope.

## BURST CLEANING COIL (L552) ADJUSTMENT

1. Receive PAL Philips pattern signal.
2. Connect synchroscope to terminal TP-46B.
3. Adjust L552 for the maximum output response on the scope.

## PAL MATRIX ADJUSTMENT

1. Tune in the colour programme including the PAL colour bar signals.
2. Set the COLOUR Control VR. to obtain the proper colour.
3. If the PAL MATRIX adjustment is in correct, the Venetian Blind would appear in the colour bars area. This case needs the adjustment.
4. At the first, adjust 1H-DL PHASE ADJ. Coil (L551) to minimize the Venetian Blind.
5. Next, connect the terminal TP-43 and the earth with capacitor (30 pF ~ 50 pF). If the Venetian Blind appears adjust 1H-DL ADJ. VR (R551) to minimize the Blind.
6. Remove the capacitor, and if the Venetian Blind still remains, adjust 1H-DL PHASE ADJ. Coil (L551) to minimize the Blind again.
7. Repeat the item 5 and 6 procedures, adjust the R551 and L551 until the Blind does not appear when the capacitor is connected.

## COLOUR PURITY ADJUSTMENT

**Note**: Before attempting any purity adjustments, the receiver should be operated for at least fifteen minutes. Purity adjustment requires Rubber Wedge kit.

1. Demagnetize the picture tube and cabinet using a degaussing coil.
2. Turn the CONTRAST and BRIGHTNESS Controls to maximum.
3. Adjust RED and BLUE CUT OFF controls (R557 and R559) to provide only a green raster. Advance the GREEN CUT OFF control (R558) if necessary.
4. Loosen the clamp screw holding the yoke, and slide the yoke backward or forward to provide vertical green belt (zone) in the picture screen.
5. Remove the Rubber Wedges.
6. Rotate and spread the tabs of the purity magnet (See figure 4) around the neck of the picture tube until a green belt is obtained in the centre of the screen. And at the same time, centre the raster vertically by adjusting the magnet.
7. Move the yoke slowly forward or backward until a uniform green screen is obtained. Tighten the clamp screw.
8. Check the purity of the red and blue raster by adjusting the CUT OFF Controls.
9. Tighten the clamp screw of the yoke temporarily.
10. Obtain a white raster, referring to "CRT GREY SCALE ADJUSTMENT".
11. Proceed with convergence adjustment.

## CRT GREY SCALE ADJUSTMENT

1. Tune in an active channel.
2. Turn the SCREEN Control (on T461) fully counter clockwise.
3. By rotating the RED, GREEN and BLUE CUT OFF Controls (R557, R558, R559) clockwise from the minimum.
4. Set the GREEN and BLUE DRIVE Controls (R252, R253) to the mid position.
5. Set the SERVICE SW. (S201) in the H. line position.
6. Short temporarily Terminal P590 on the CRT DRIVE Board.
7. Set the CONTRAST, COLOUR Controls to minimum and BRIGHTNESS Control to centre position.
8. Rotate the SCREEN Control gradually clockwise until the first line appears slightly on the screen. Then turn fully counterclockwise the two CUT OFF Controls corresponding to the colours of the first and the second horizontal lines to eliminate the lines.
9. Rotate the SCREEN Control graudally clockwise until the first horizontal line of a colour (RED, GREEN or BLUE) appears slightly on the screen. Set the SCREEN Control to this position.
   At the base of the colour, rotate the remaining two CUT OFF Controls gradually clockwise until the horizontal lines of each colour appear sightly on the screen.
10. Open the terminal P590 on the CRT DRIVE Board.
11. Adjust the CUT OFF Controls to obtain the slightly lighted horizontal lines in the same levels of three colours (RED, GREEN and BLUE).
    The lines may loock like white if the CUT OFF Controls are adjusted properly.
12. Return the SERVICE SW. (S201) in the receiving position.
13. Set the BRIGHTNESS Control to the maximum and COLOUR Control to the minimum.
14. Adjust the BLUE and GREEN DRIVE Controls (R252/R253) to obtain proper white-balanced picture in high light areas.
15. Set the BRIGHTNESS and CONTRAST Controls to obtain dark grey raster. Then check the white balance in low brightness. If the white balance is not proper, retouch the CUT OFF Controls and DRIVE Controls to obtain a good white balance in both low and high light areas.

## SUB-BRIGHTNESS ADJUSTMENT

1. Tune in a colour programme.
2. Set the CONTRAST Control the minimum and the BRIGHTNESS Control the maximum.
3. Set the COLOUR Control to the minimum.
4. Set the SUB-BRIGHT. Control (R258) to the centre and leave the receiver for five minutes in this state.
5. Watching the picture well, adjust the SUB-BRIGHT. Control in the position where the picture does not show evidence of blooming in high bright area and not appear too dark in low bright portion.
6. Check the proper picture variation by rotating the CONTRAST and BRIGHTNESS Controls to both extremes.
7. If the picture does not appear dark with the CONTRAST and BRIGHTNESS Controls turned to the minimum, or not appear bright with the Controls turned to the maximum, adjust the SUB-BRIGHT. Control

## CONVERGENCE ADJUSTMENTS

**Note**: Before attempting any convergence adjustments, the receiver should be operated for at least fifteen minutes.

### ■ Centre Convergence Adjustment

1. Receive crosshatch pattern with a colour bar signal generator.
2. Adjust the BRIGHTNESS and CONTRAST Controls for well defined pattern.
3. Adjust two tabs of the 4-Pole Magnets to change the angle between them (See figure 4.) and superimpose red and blue vertical lines in the center area of the picture screen. (See figure 5.)
4. Turn the both tabs at the same time keeping the constant angle to superimpose red and blue horizonal lines at the centre of the screen. (See figure 5.)
5. Adjust two tabs of 6-Pole Magnets to superimpose red/blue line and green one. Adjusting the angle affects the vertical lines and rotating both magnets affects the horizontal lies.
6. Repeat adjustments 3, 4, 5 with understanding red, green and blue movement, because 4-Pole Magnets and 6-Pole magnets have mutual affection and it makes dots movement complex.

### ■ Circumference Convergence Adjustment

1. Loosen the clamping screw of deflection yoke to allow the yoke to tilt.
2. Put a wedge as shown in figure 3. temporarily. (Do not remove cover paper on adhesive part of the wedge.)
3. Tilt front of the deflection yoke up and down to obtain better convergence in circumference. (See figure 5.)
   Push the mounted wedge into the space between picture tube and yoke to fix the yoke temporarily.
4. Put other wedge into bottom space and remove the cover paper to stick.
5. Tilt front of the yoke right or left to obtain better convergence in circumference. (See figure 5.)
6. Keep the yoke position and put another wedge in either upper space. Remove cover paper and stick the wedge on picture tube to fix the yoke.
7. Detach the temporarily mounted wedge and put it in another upper space. Stick it on picture tube to fix the yoke.
8. After fixing three wedges, recheck overall convergence. Tighten the screw firmly to fix the yoke and check the yoke is firm.

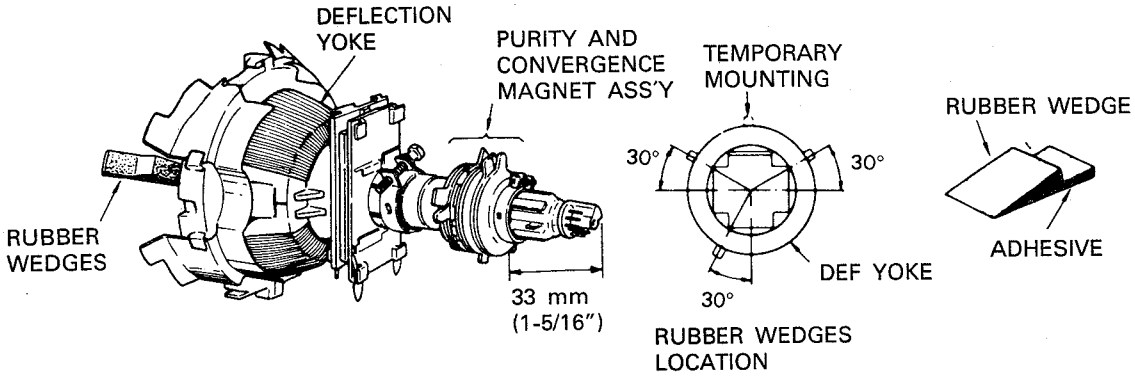



**Figure 3.**

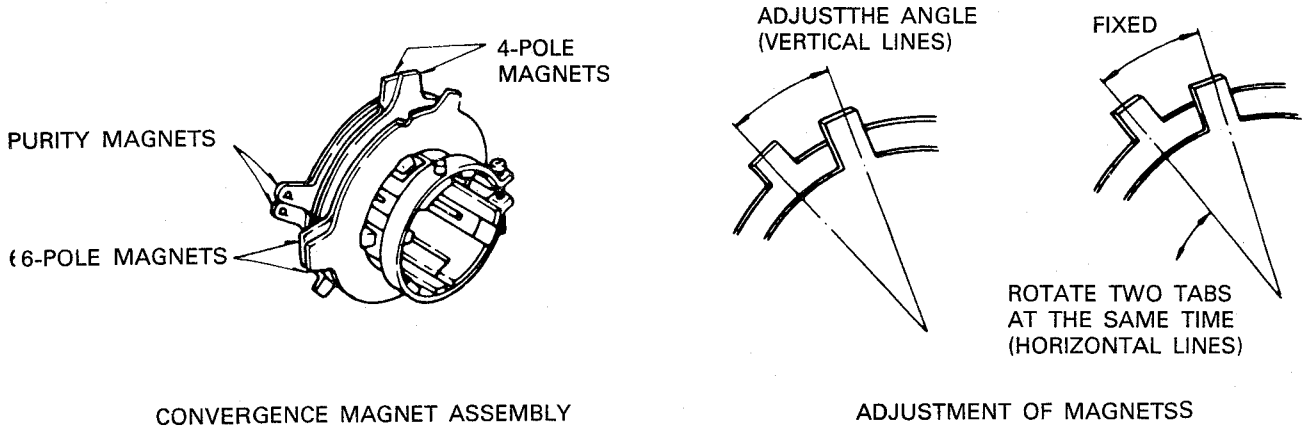



**Figure 4.**

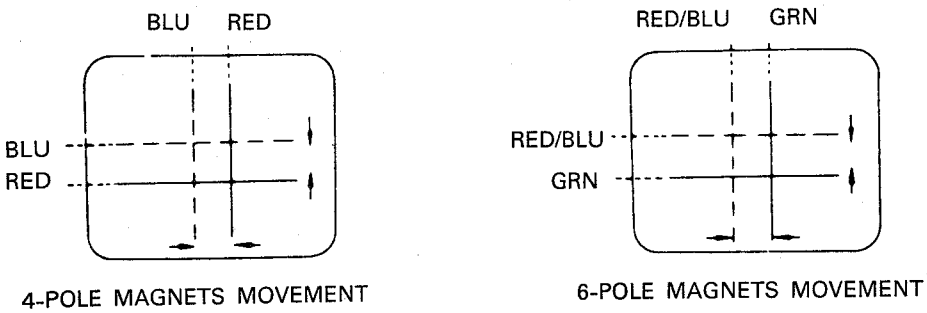
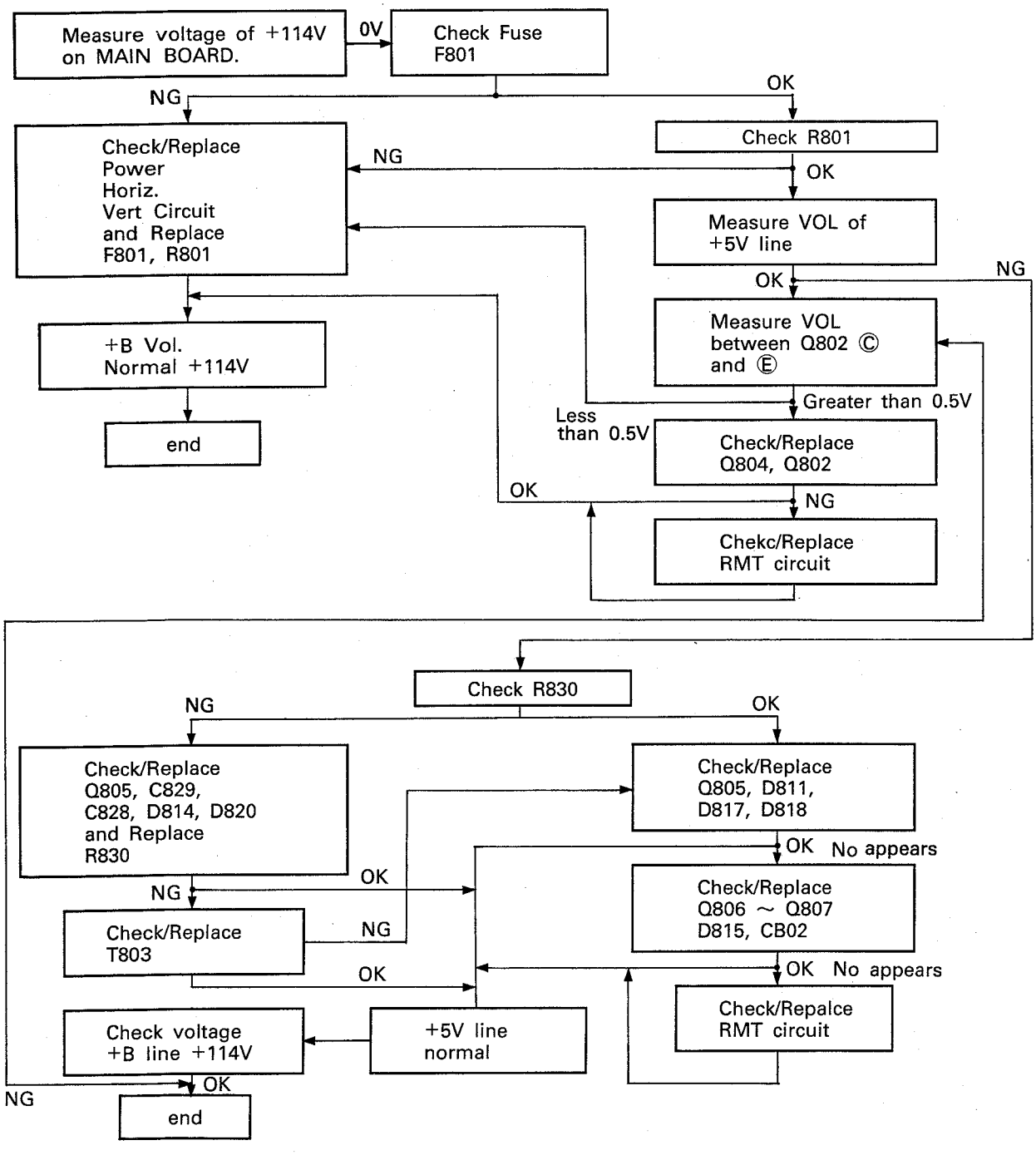



**Figure 5. Dot Movemant Pattern.**

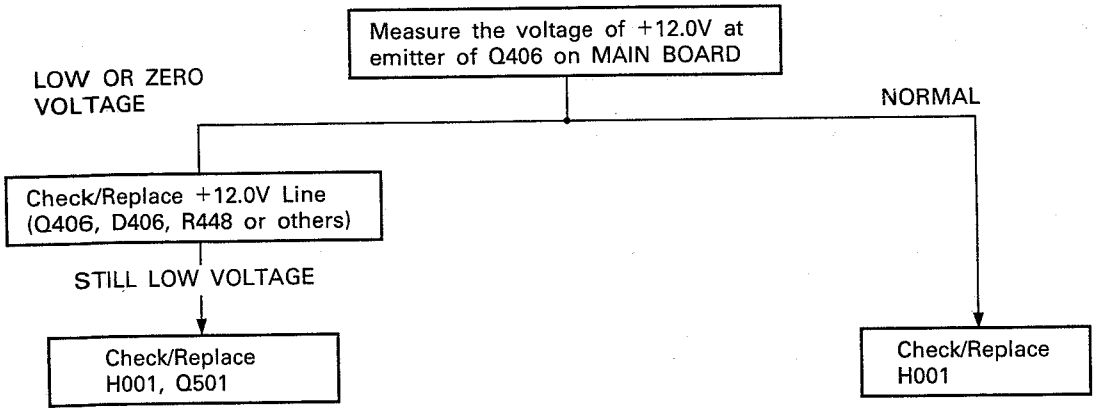
# TROUBLESHOOTING CHARTS

The following charts are devoted to troubleshooting which, if followed carefully, will assist you in tracking down a fault to the correct stage.
In order to utilize the charts (fault trees), firstly establish the complaint, i.e. — No Raster, No Sound.
Locate the chart applicable and then progress through the various alternatives until a final block indicates the offending components or stage.

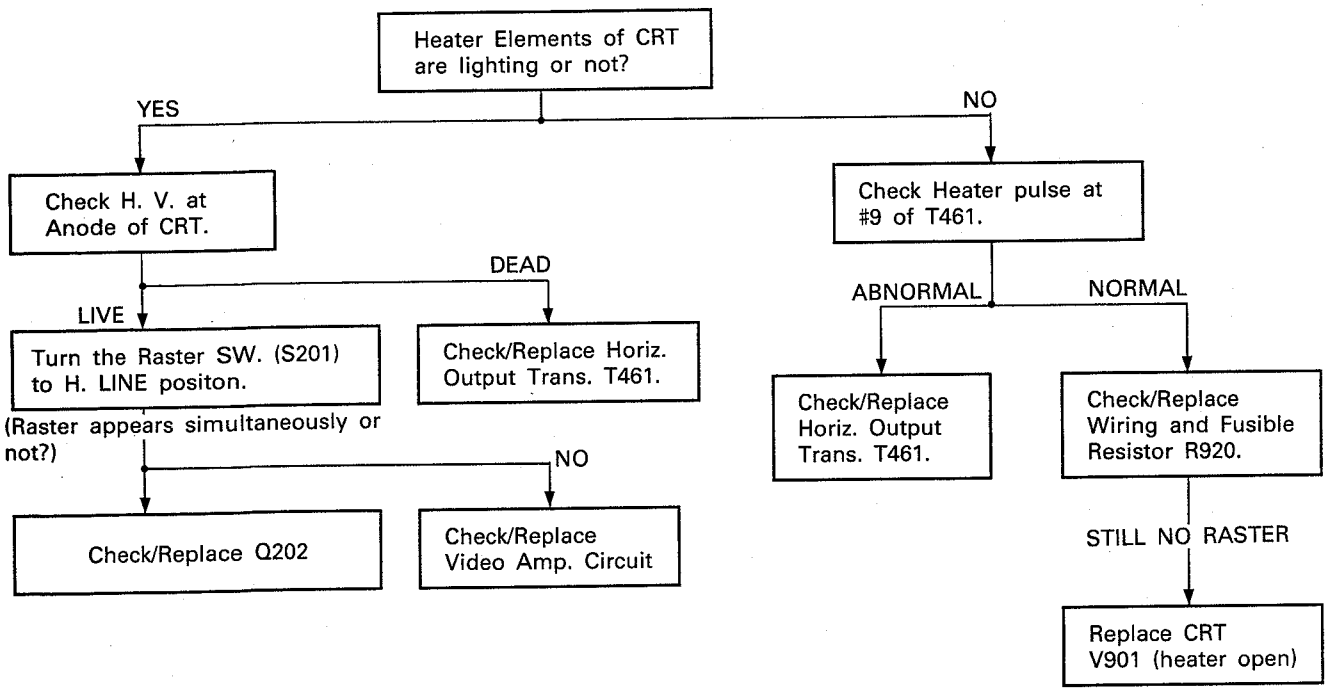
## 1. NO RASTER AND NO SOUND



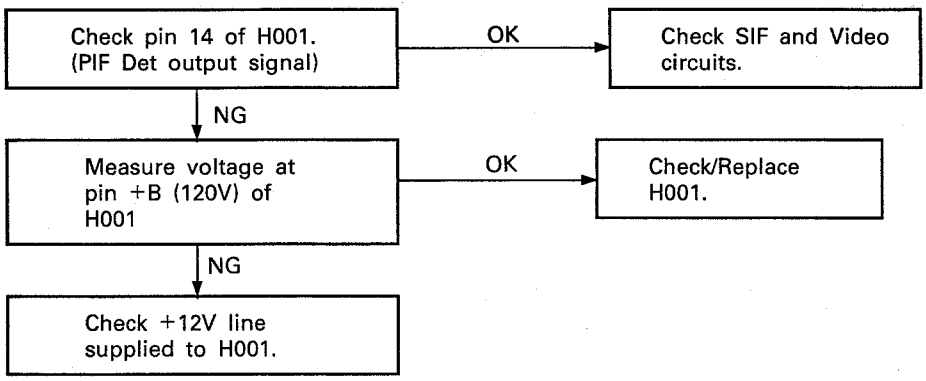
## 2. NO RASTER (SOUND NOISE OR WEAK)


Measure the voltage of +12.0V at emitter of Q406 on MAIN BOARD
LOW OR ZERO VOLTAGE
NORMAL
Check/Replace +12.0V Line (Q406, D406, R448 or others)
STILL LOW VOLTAGE
Check/Replace H001, Q501
Check/Replace H001

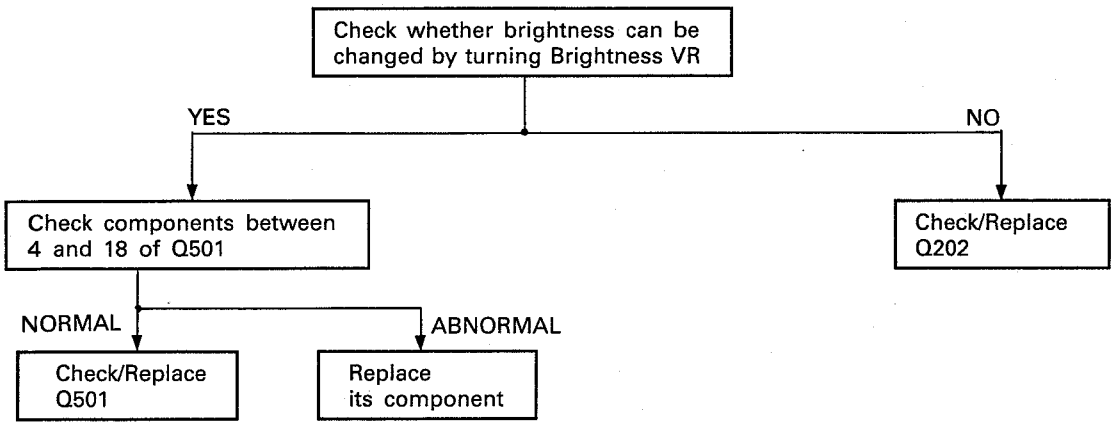
## 3. NO RASTER (SOUND OK)



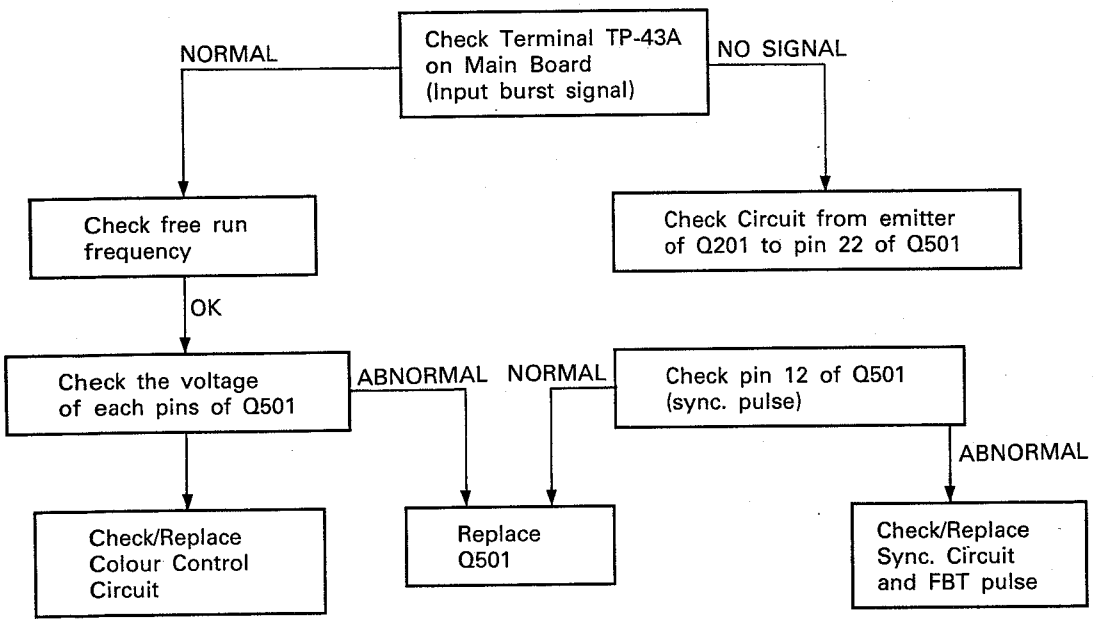
## 4. NO RASTER (RASTER REMAIN) AND NO SOUND



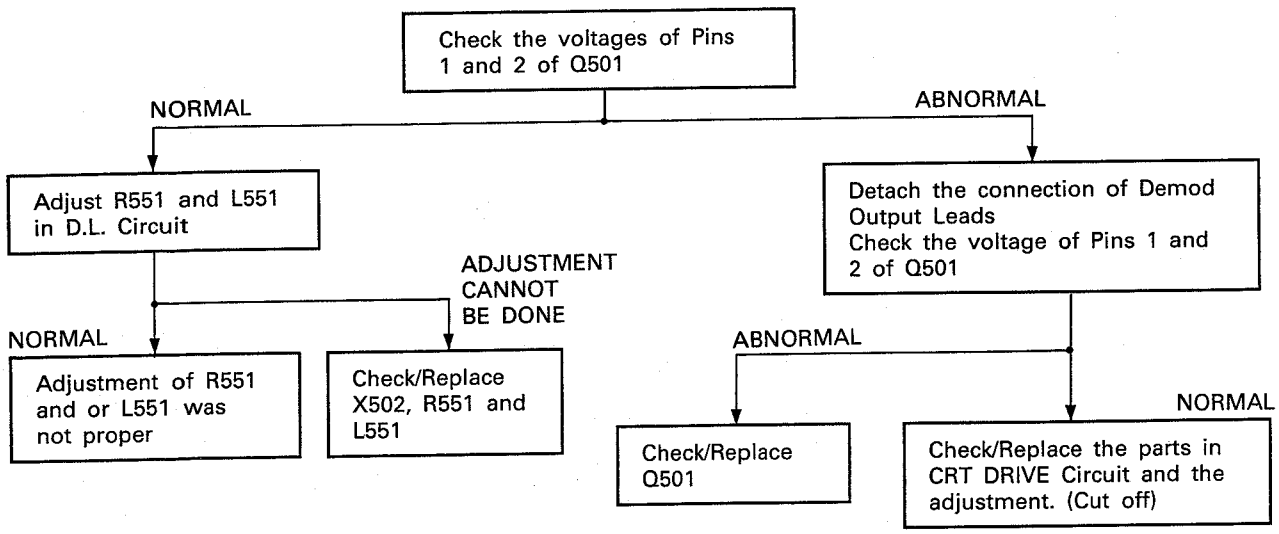

## 5. NO PICTURE (RASTER AND SOUND OK)



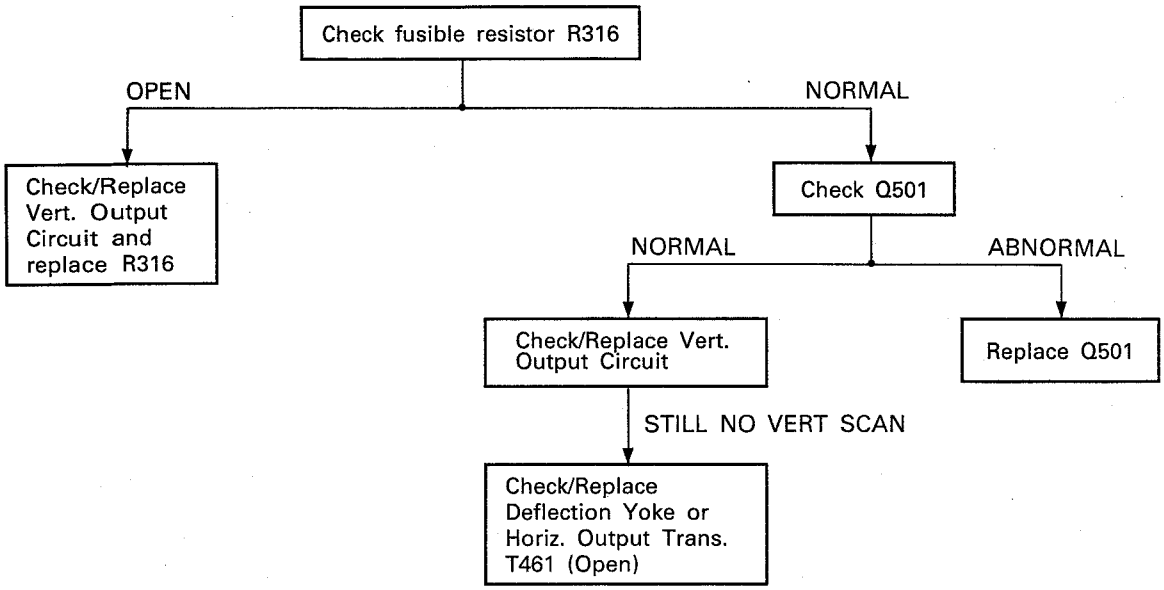
## 6. NO COLOUR


Check Terminal TP-43A on Main Board (Input burst signal)
NORMAL
NO SIGNAL
Check free run frequency
Check Circuit from emitter of Q201 to pin 22 of Q501
OK
Check the voltage of each pins of Q501
ABNORMAL
NORMAL
Check pin 12 of Q501 (sync. pulse)
ABNORMAL
Check/Replace Colour Control Circuit
Replace Q501
Check/Replace Sync. Circuit and FBT pulse

## 7. SPECIFIC TINTED COLOUR


Check the voltages of Pins 1 and 2 of Q501
NORMAL
ABNORMAL
Adjust R551 and L551 in D.L. Circuit
Detach the connection of Demod Output Leads
Check the voltage of Pins 1 and 2 of Q501
ADJUSTMENT CANNOT BE DONE
NORMAL
ABNORMAL
NORMAL
Adjustment of R551 and or L551 was not proper
Check/Replace X502, R551 and L551
Check/Replace Q501
Check/Replace the parts in CRT DRIVE Circuit and the adjustment. (Cut off)

## 8. NO VERT. SCAN (ONE HORIZ. LINE RASTER)



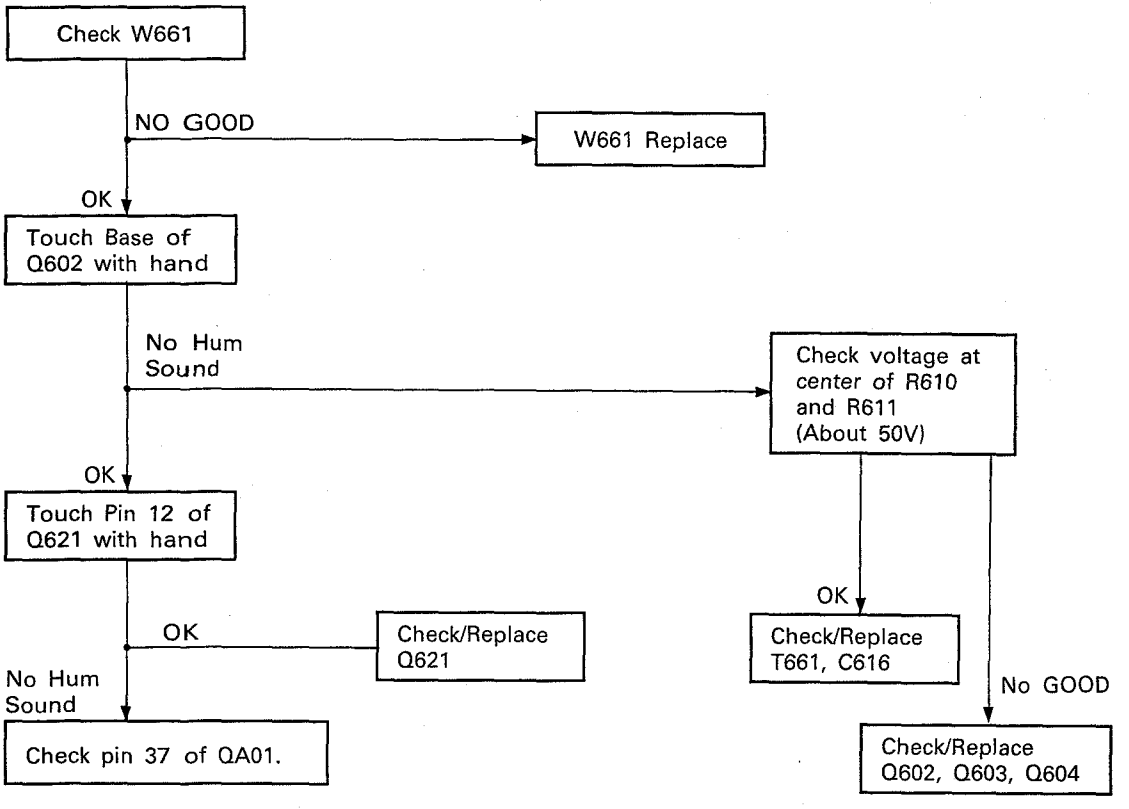

## 9. OUT OF VERT. SYNC. AND HORIZ. SYNC.

Check/Replace Sync. Circuit from emitter of Q201 to pin 16 of Q501 and Hor. OSC Circuit from pin 7 of Q501 to pin 11 of Q501

## 10.OUT OF HORIZ. SYNC.

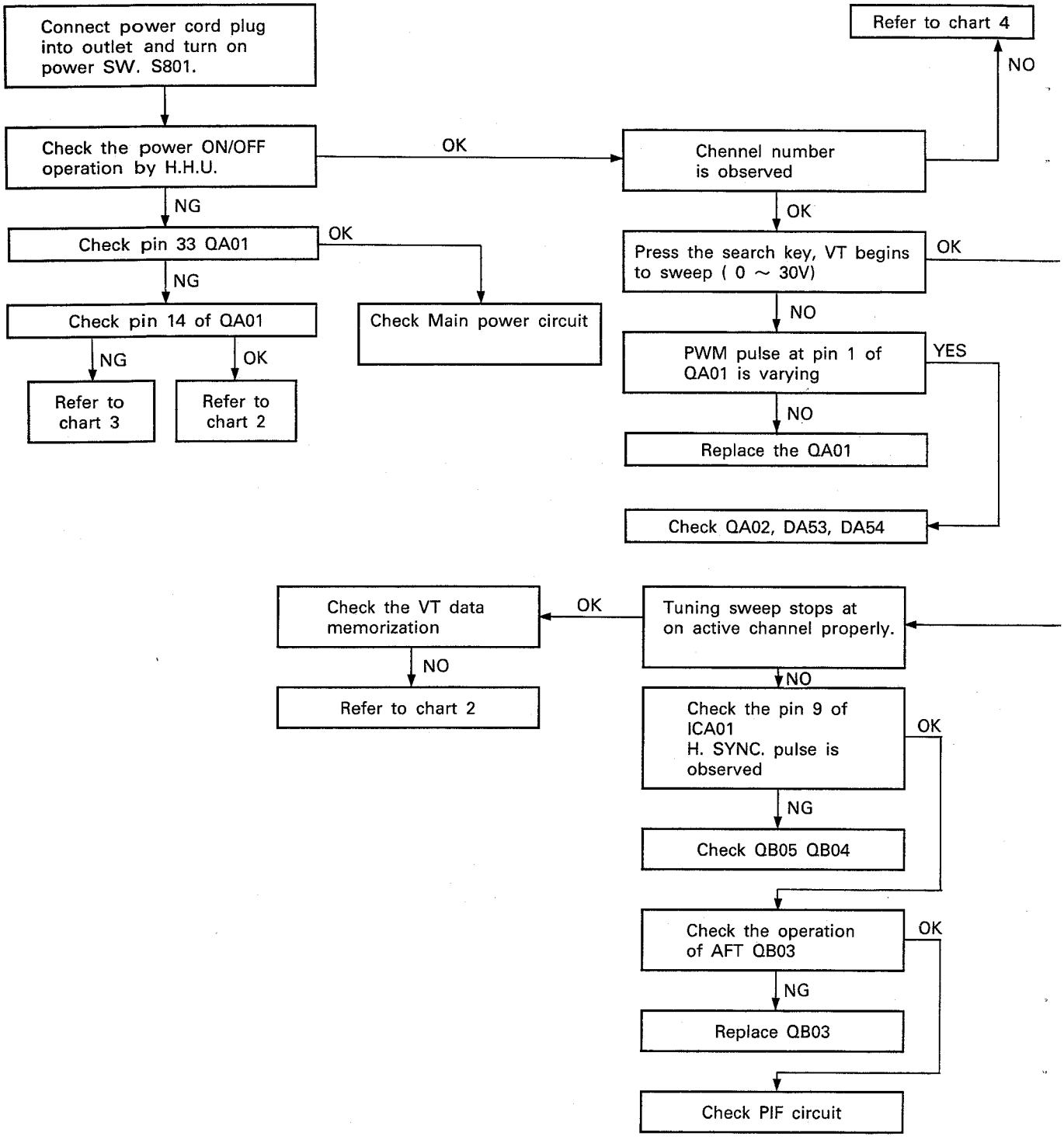
Check/Replace Horiz. OSC Circuit. Horiz. Hold and Horiz. AFC Circuit connected to Pins 8 and 12 of Q501 Check/Replace Q501.

## 11. NO SOUND


Check W661
NO GOOD
W661 Replace
OK
Touch Base of Q602 with hand
No Hum Sound
Check voltage at center of R610 and R611 (About 50V)
OK
Touch Pin 12 of Q621 with hand
OK
Check/Replace Q621
OK
Check/Replace T661, C616
No Hum Sound
No GOOD
Check pin 37 of QA01.
Check/Replace Q602, Q603, Q604

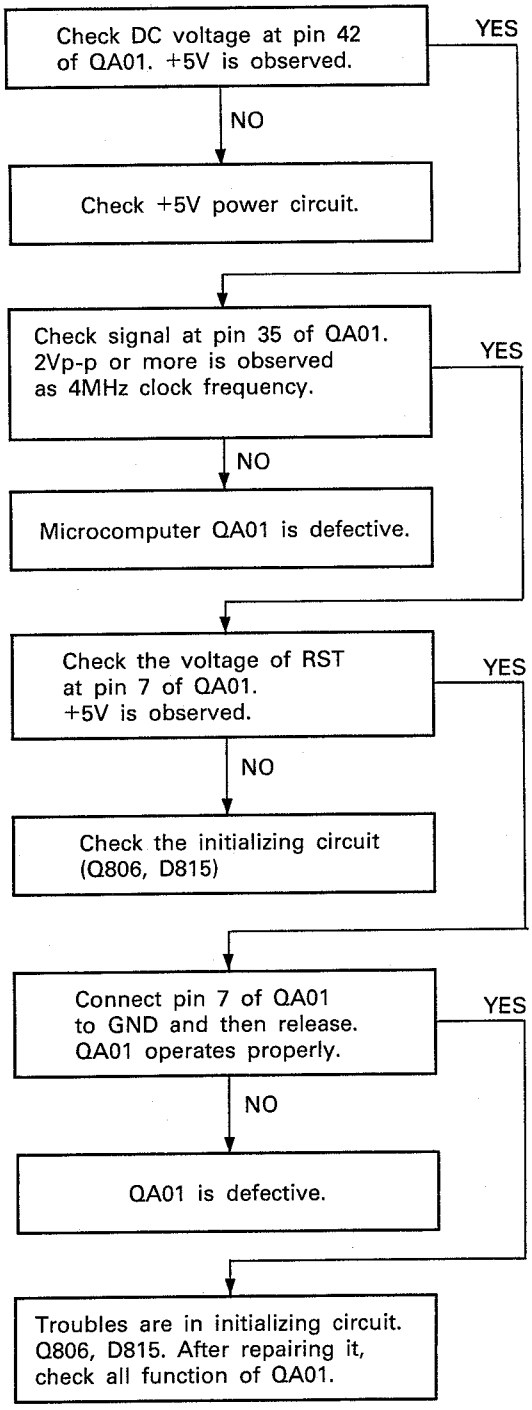
## 12. CHANNEL SELECTOR TROUBLE

**[CHART 1]**



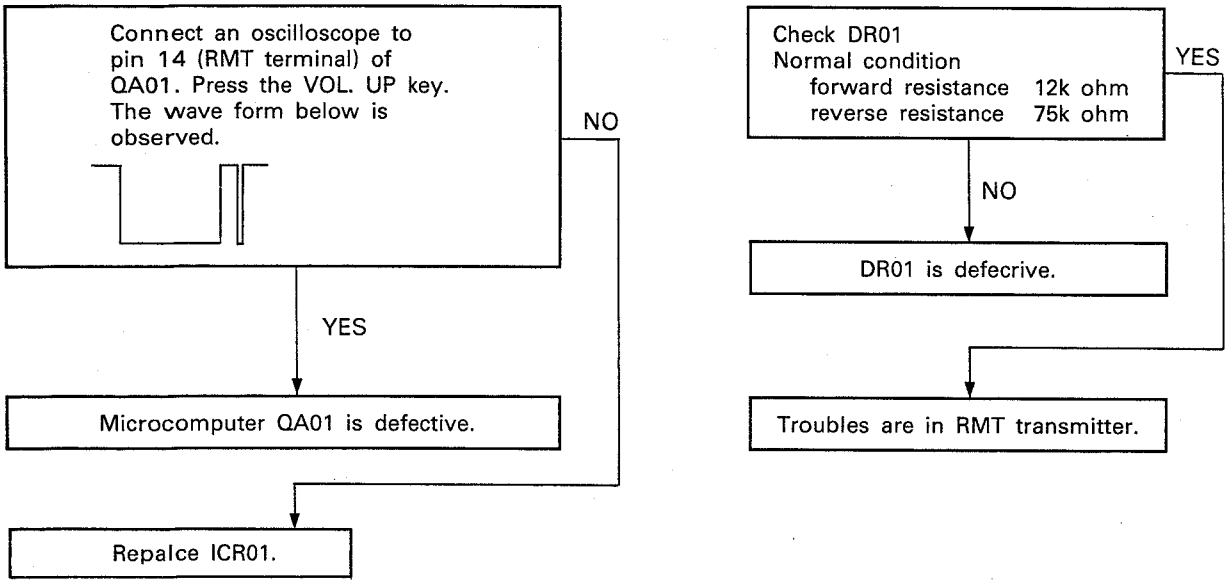
**[CHART 2] Microcomputer QA01 Operation Check**

**Note**: Before checking Microcomputer, check that control buttons and their connection work properly.


Check DC voltage at pin 42 of QA01. +5V is observed.
YES
NO
Check +5V power circuit.
Check signal at pin 35 of QA01. 2Vp-p or more is observed as 4MHz clock frequency.
YES
NO
Microcomputer QA01 is defective.
Check the voltage of RST at pin 7 of QA01. +5V is observed.
YES
NO
Check the initializing circuit (Q806, D815)
Connect pin 7 of QA01 to GND and then release. QA01 operates properly.
YES
NO
QA01 is defective.
Troubles are in initializing circuit. Q806, D815. After repairing it, check all function of QA01.

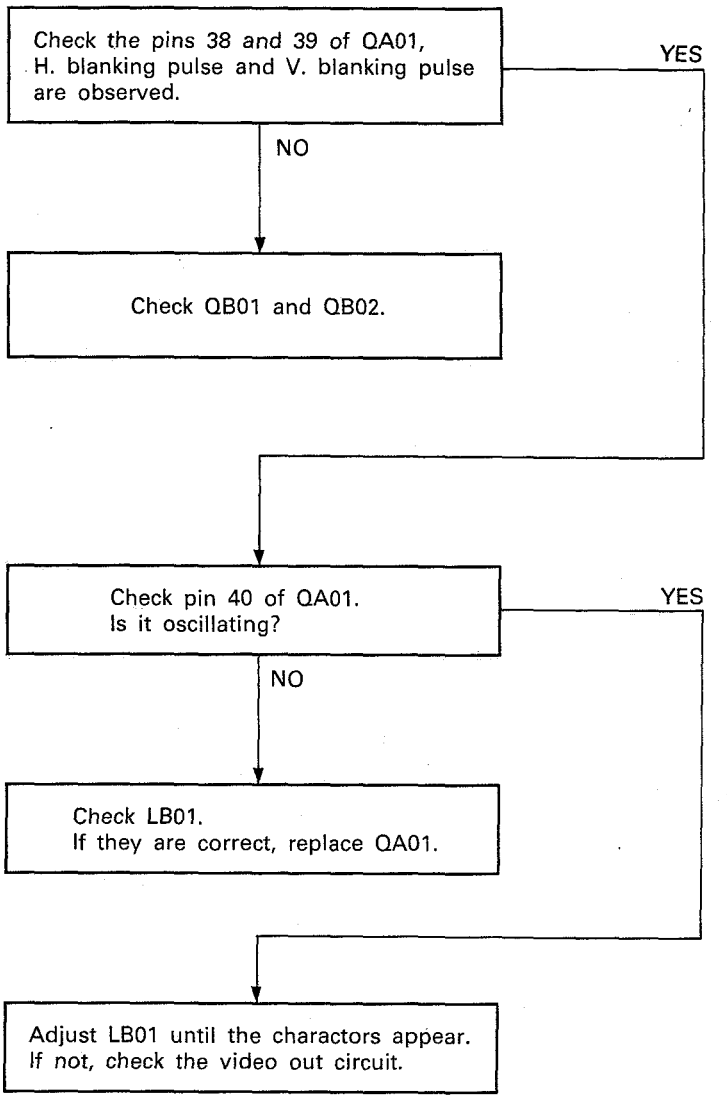
**[CHART 3] Remote Control Operation Check**

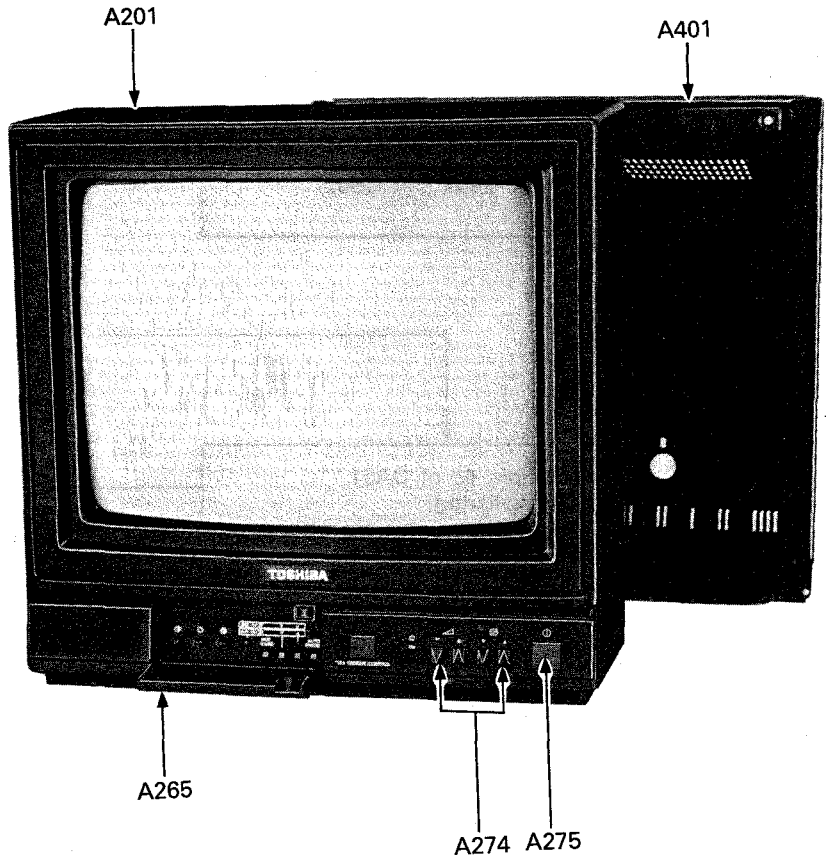
**Note:** Before checking RMT operation, check that key operation on TV set is proper.



**[CHART 4]**

**(1) On Screen Display Operation Check**


Check the pins 38 and 39 of QA01, H. blanking pulse and V. blanking pulse are observed.
YES
NO
Check QB01 and QB02.
Check pin 40 of QA01. Is it oscillating?
YES
NO
Check LB01. If they are correct, replace QA01.
Adjust LB01 until the charactors appear. If not, check the video out circuit.




| Location No. | Part No. | Description |
|---|---|---|
| A201 | 23417138 | Front Cover |
| A265 | 23422065 | Door |
| A269 | 23848226 | Push Catch |
| A274 | 23443132 | Knob, KEY-BOARD |
| A275 | 23443134 | Knob, POWER |
| A276 | 23836883 | Spring |
| A277 | 23846534 | Piece |
| A401 | 23999269 | Back Cover |
| A403 | 23995883 | Lable, Model Number |
| A701 | 23523083 | Carton Box |
| A702A | 23934723 | Packing, Top |
| A702B | 23934724 | Packing, Bottom |
| B141 | 23712306 | Screw, PP3X.5X6SZN |
| K902 | 23120517 | Remote Hand Unit, CT-9287 |
| Y101 | 23994449 | Owner's Guidebook |
| Y125 | 23293988 | Adapter, Aerial Matching |

# CHASSIS REPLACEMENT PARTS LIST

**WARNING**: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION" , "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 2 OF THIS MANUAL.

**CAUTION:** The international hazard symbols in the schematic diagram and the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list. The mounting position of replacements is to be identical with originals. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE on page 2. Do not degrade the safety of the receiver through improper servicing.

*NOTICE: The part number must be used when ordering parts, in order to assist in processing, be sure to include the Model number and Description.*

**ABBREVIATIONS:**

Capacitors ..... CD :Ceramic Disk PF :Plastic Film EL :Electrolytic
Resistors ..... CF :Carbon Film CC :Carbon Composition MF :Metal Film
OMF :Oxide Metal Film VR :Variable Resistor FR :Fusible Resistor

(All CD and PF capacitors are ±5%, 50V and all resistors, ±5%, 1/6W unless otherwise noted.)

| Location No. | Part No. | Description |
|---|---|---|
| **CAPACITORS** | | |
| C115 | 24633470 | EL, 47μF, 16V |
| C204 | 24636100 | EL, 10μF, 50V |
| C211 | 24636229 | EL, 2.2μF, 50V |
| C212 | 24794102 | EL, 1000μF, 16V |
| C213 | 24538224 | PF, 0.22μF |
| C214 | 24636229 | EL, 2.2μF, 50V |
| C218 | 24232103 | CD, 0.01μF, +80%, −20% |
| C219 | 24436220 | CD, 22pF |
| C240 | 24636478 | EL, 0.47μF, 50V |
| C291 | 24636220 | EL, 22μF, 50V |
| C301 | 24636229 | EL, 2.2μF, 50V |
| C302 | 24212332 | CD, 3300pF, ±10% |
| C305 | 24617998 | EL, 1μF, ±10%, 50V |
| C307 | 24796101 | EL, 100μF, 35V |
| C311 | 24796471 | EL, 470μF, 35V |
| C314 | 24435510 | CD, 51pF, 500V |
| C315 | 24095677 | PF, 0.1μF, ±10%, 100V |
| C316 | 24795332 | EL, 3300μF, 25V |
| C323 | 24212332 | CD, 3300pF, ±10% |
| C325 | 24796101 | EL, 100μF, 35V |
| C326 | 24232103 | CD, 0.01μF, +80%, −20% |
| C330 | 24617891 | EL, 1μF, ±10%, 50V |
| C331 | 24212681 | CD, 680pF, ±10% |
| C401 | 24436271 | CD, 270pF |
| C402 | 24436821 | CD, 820pF |
| C403 | 24538223 | PF, 0.022μF |
| C404 | 24794101 | EL, 100μF, 16V |
| C405 | 24232103 | CD, 0.01μF, +80%, −20% |
| C406 | 24635339 | EL, 3.3μF, 35V |
| C407 | 24538183 | PF, 0.018μF |
| C416 | 24214471 | CD, 470pF, ±10%, 500V |
| ⚠ C440 | 24095921 | PF, 5600pF, 1600V |
| ⚠ C442 | 24095947 | PF, 0.39μF, 200V |
| C443 | 24214221 | CD, 220pF, ±10%, 500V |
| ⚠ C444 | 24442271 | CD, 270pF, ±10%, 2kV |
| C445 | 24833223 | PF, 0.022μF, ±10%, 200V |
| C446 | 24633471 | EL, 470μF, 16V |
| C449 | 24212471 | CD, 470pF, ±10% |
| C450 | 24828124 | PF, 0.12μF, 200V |
| C451 | 24214221 | CD, 220pF, ±10%, 500V |

| Location No. | Part No. | Description |
|---|---|---|
| C457 | 24644100 | EL, 10μF, 250V |
| ⚠ C463 | 24212222 | CD, 2200pF, ±10% |
| C480 | 24693302 | PF, 3000pF, 100V |
| C481 | 24214681 | CD, 680pF, ±10%, 500V |
| C482 | 24436101 | CD, 100pF |
| C499 | 24794471 | EL, 470μF, 16V |
| C501 | 24436180 | CD, 18pF |
| C502 | 24436100 | CD, 10pF, ±0.25pF |
| C507 | 24232103 | CD, 0.01μF, +80%, −20% |
| C509 | 24353270 | CD, 27pF |
| C510 | 24232103 | CD, 0.01μF, +80%, −20% |
| C511 | 24538103 | PF, 0.01μF |
| C512 | 24636229 | EL, 2.2μF, 50V |
| C513 | 24085031 | EL, 1μF, ±20%, 25V, Non-Polar |
| C514 | 24232103 | CD, 0.01μF, +80%, −20% |
| C515 | 24636229 | EL, 2.2μF, 50V |
| C516 | 24636479 | EL, 4.7μF, 50V |
| C517 | 24232103 | CD, 0.01μF, +80%, −20% |
| C518 | 24232103 | CD, 0.01μF, +80%, −20% |
| C521 | 24357390 | CD, 39pF |
| C531 | 24212102 | CD, 1000pF, ±10% |
| C532 | 24212102 | CD, 1000pF, ±10% |
| C533 | 24212102 | CD, 1000pF, ±10% |
| C534 | 24436101 | CD, 100pF |
| C535 | 24436101 | CD, 100pF |
| C536 | 24436101 | CD, 100pF |
| C549 | 24538223 | PF, 0.022μF |
| C551 | 24436101 | CD, 100pF |
| C552 | 24436101 | CD, 100pF |
| C553 | 24436101 | CD, 100pF |
| C605 | 24435470 | CD, 47pF, 500V |
| C610 | 24640978 | EL, 47μF, 160V |
| C616 | 24085040 | EL, 2.2μF, 250V, Non-Polar |
| C619 | 24206229 | EL, 2.2μF, 50V |
| C621 | 24436470 | CD, 47pF |
| C622 | 24436470 | CD, 47pF |
| C623 | 24591473 | PF, 0.047μF |
| C624 | 24797470 | EL, 47μF, 50V |
| C625 | 24436510 | CD, 51pF |
| C626 | 24436561 | CD, 560pF |

| Location No. | Part No. | Description |
|---|---|---|
| C627 | 24538473 | PF, 0.047μF |
| C628 | 24085031 | EL, 1μF, ±20%, 25V, Non-Polar |
| C629 | 24636100 | EL, 10μF, 50V |
| C630 | 24232103 | CD, 0.01μF, +80%, −20% |
| C631 | 24797470 | EL, 47μF, 50V |
| C632 | 24206229 | EL, 2.2μF, 50V |
| C633 | 24636100 | EL, 10μF, 50V |
| C801 | 24095951 | PF, 0.1μF, ±20%, AC250V |
| C803 | 24094906 | CD, 4700pF, +80%, −20%, AC250V |
| C804 | 24094906 | CD, 4700pF, +80%, −20%, AC250V |
| C805 | 24094906 | CD, 4700pF, +80%, −20%, AC250V |
| C806 | 24094906 | CD, 4700pF, +80%, −20%, AC250V |
| C810 | 24086871 | EL, 120μF, ±20%, 400V |
| C811 | 24641100 | EL, 10μF, 100V |
| C812 | 24640972 | EL, 33μF, 160V |
| C813 | 24211102 | CD, 1000pF, ±10%, 2kV |
| C814 | 24215102 | CD, 1000pF, ±10%, 1kV |
| C820 | 24214221 | CD, 220pF, ±10%, 500V |
| C821 | 24640968 | EL, 10μF, 400V |
| C825 | 24442101 | CD, 100pF, ±10%, 2kV |
| C827 | 24214182 | CD, 1800pF, ±10%, 500V |
| C828 | 24797470 | EL, 47μF, 50V |
| C829 | 24797470 | EL, 47μF, 50V |
| C830 | 24797101 | EL, 100μF, 50V |
| C832 | 24232103 | CD, 0.01μF, +80%, −20% |
| C902 | 24095981 | PF, 2200pF, 1600V |
| CA01 | 24538104 | PF, 0.1μF |
| CA03 | 24212391 | CD, 390pF, ±10% |
| CA05 | 24797330 | EL, 33μF, 50V |
| CA06 | 24232103 | CD, 0.01μF, +80%, −20% |
| CA07 | 24538104 | PF, 0.1μF |
| CA08 | 24538184 | PF, 0.18μF |
| CA09 | 24206010 | EL, 1μF, 50V |
| CA11 | 24206229 | EL, 2.2μF, 50V |
| CA12 | 24212221 | CD, 220pF, ±10% |
| CA18 | 24794470 | EL, 47μF, 16V |
| CA40 | 24206339 | EL, 3.3μF, 50V |
| CA41 | 24232103 | CD, 0.01μF, +80%, −20% |
| CA43 | 24232103 | CD, 0.01μF, +80%, −20% |
| CA44 | 24232103 | CD, 0.01μF, +80%, −20% |
| CA53 | 24232103 | CD, 0.01μF, +80%, −20% |
| CA54 | 24641010 | EL, 1μF, 100V |
| CA62 | 24206339 | EL, 3.3μF, 50V |
| CB02 | 24203100 | EL, 10μF, ±20%, 16V |
| CB08 | 24538104 | PF, 0.1μF |
| CB09 | 24636010 | EL, 1μF, 50V |
| CB11 | 24212561 | CD, 560pF, ±10% |
| CB12 | 24212561 | CD, 560pF, ±10% |
| CB13 | 24212392 | CD, 3900pF, ±10% |
| CB14 | 24232103 | CD, 0.01μF, +80%, −20% |
| CB15 | 24212101 | CD, 100pF, ±10% |
| CB16 | 24212101 | CD, 100pF, ±10% |
| CB17 | 24212471 | CD, 470pF, ±10% |
| CB18 | 24212102 | CD, 1000pF, ±10% |
| CB20 | 24636100 | EL, 10μF, 50V |
| CB21 | 24797470 | EL, 47μF, 50V |
| CB22 | 24232103 | CD, 0.01μF, +80%, −20% |
| CB23 | 24436101 | CD, 100pF |
| CB25 | 24636100 | EL, 10μF, 50V |
| CB40 | 24436330 | CD, 33pF |
| CR01 | 24501222 | PF, 2200pF |
| CR02 | 24538683 | PF, 0.068μF |
| CR03 | 24203100 | EL, 10μF, ±20%, 16V |
| CR04 | 24202330 | EL, 33μF, ±20%, 10V |
| CR05 | 24203100 | EL, 10μF, ±20%, 16V |
| CR06 | 24203101 | EL, 100μF, ±20%, 16V |
| CR07 | 24501222 | PF, 2200pF |

## RESISTORS

| | | |
|---|---|---|
| R201 | 24366331 | CF, 330 ohm |
| R214 | 24366472 | CF, 4700 ohm |
| R215 | 24366471 | CF, 470 ohm |
| R217 | 24366102 | CF, 1k ohm |
| R218 | 24366561 | CF, 560 ohm |
| R219 | 24553471 | OMF, 470 ohm, 1W |
| R220 | 24366682 | CF, 6800 ohm |
| R224 | 24366183 | CF, 18k ohm |
| R225 | 24366103 | CF, 10k ohm |
| R226 | 24552332 | OMF, 3300 ohm, 1/2W |
| R227 | 24552331 | OMF, 330 ohm, 1/2W |
| R228 | 24366562 | CF, 5600 ohm |
| R233 | 24366102 | CF, 1k ohm |
| R234 | 24366562 | CF, 5600 ohm |
| R236 | 24366473 | CF, 47k ohm |
| R237 | 24366473 | CF, 47k ohm |
| R238 | 24366473 | CF, 47k ohm |
| R241 | 24360154 | CF, 150k ohm, 1/8W |
| R249 | 24366152 | CF, 1500 ohm |
| R251 | 24061594 | VR, 200 ohm, 1/8W |
| R252 | 24061594 | VR, 200 ohm, 1/8W |
| R256 | 24063730 | VR, 10k ohm, 0.08W |
| R257 | 24063610 | VR, 1k ohm, 0.08W |
| R258 | 24061590 | VR, 5k ohm, 1/8W |
| R265 | 24366101 | CF, 100 ohm |
| R281 | 24366101 | CF, 100 ohm |
| R282 | 24366152 | CF, 1500 ohm |
| R283 | 24366101 | CF, 100 ohm |
| R291 | 24366682 | CF, 6800 ohm |
| R292 | 24366153 | CF, 15k ohm |
| R301 | 24366131 | CF, 130 ohm |
| R302 | 24366124 | CF, 120k ohm |
| R303 | 24366561 | CF, 560 ohm |
| R304 | 24366102 | CF, 1k ohm |
| R315 | 24554271 | OMF, 270 ohm, 2W |
| R316 | 24982339 | MF, 3.3 ohm, 1/2W |
| R320 | 24366102 | CF, 1k ohm |
| R323 | 24322279 | OMF, 2.7 ohm, 1W |
| R324 | 24366683 | CF, 68k ohm |
| R327 | 24366134 | CF, 130k ohm |
| R328 | 24366363 | CF, 36k ohm |
| R329 | 24381122 | OMF, 1200 ohm, 1/2W |
| R335 | 24552102 | OMF, 1k ohm, 1/2W |
| R336 | 24366223 | CF, 22k ohm |
| R351 | 24061587 | VR, 50k ohm, 1/8W |
| R401 | 24366203 | CF, 20k ohm |
| R402 | 24366153 | CF, 15k ohm |
| R404 | 24366562 | CF, 5600 ohm |
| R405 | 24366472 | CF, 4700 ohm |
| R406 | 24366271 | CF, 270 ohm |
| R407 | 24366822 | CF, 8200 ohm |
| R408 | 24360185 | CF, 1.8M ohm, 1/8W |
| R410 | 24366472 | CF, 4700 ohm |
| R411 | 24366511 | CF, 510 ohm |

| Location No. | Part No. | Description |
|---|---|---|
| R413 | 24366472 | CF, 4700 ohm |
| R416 | 24555202 | OMF, 2k ohm, 3W |
| R437 | 24383182 | OMF, 1800 ohm, 2W |
| R440 | 24366103 | CF, 10k ohm |
| R441 | 24366103 | CF, 10k ohm |
| R442 | 24547479 | FR, 4.7 ohm, 1W |
| R443 | 24553681 | OMF, 680 ohm, 1W |
| R444 | 24322109 | OMF, 1 ohm, 1W |
| R447 | 24383182 | OMF, 1800 ohm, 2W |
| R448 | 24547829 | FR, 8.2 ohm, 1W |
| R449 | 24366221 | CF, 220 ohm |
| R451 | 24066951 | VR, 20k ohm, 1/10W |
| R501 | 24366821 | CF, 820 ohm |
| R506 | 24366182 | CF, 1800 ohm |
| R509 | 24366471 | CF, 470 ohm |
| R510 | 24366125 | CF, 1.2M ohm |
| R511 | 24366223 | CF, 22k ohm |
| R512 | 24366562 | CF, 5600 ohm |
| R513 | 24366154 | CF, 150k ohm |
| R514 | 24366220 | CF, 22 ohm |
| R515 | 24366183 | CF, 18k ohm |
| R516 | 24366125 | CF, 1.2M ohm |
| R517 | 24366155 | CF, 1.5M ohm |
| R518 | 24366101 | CF, 100 ohm |
| R519 | 24945475 | CC, 4.7M ohm, ±10%, 1/4W |
| R520 | 24366223 | CF, 22k ohm |
| R521 | 24366332 | CF, 3300 ohm |
| R522 | 24366272 | CF, 2700 ohm |
| R523 | 24366331 | CF, 330 ohm |
| R524 | 24366272 | CF, 2700 ohm |
| R525 | 24366331 | CF, 330 ohm |
| R526 | 24366182 | CF, 1800 ohm |
| R528 | 24366272 | CF, 2700 ohm |
| R529 | 24366331 | CF, 330 ohm |
| R540 | 24366121 | CF, 120 ohm |
| R541 | 24366121 | CF, 120 ohm |
| R542 | 24366151 | CF, 150 ohm |
| R543 | 24366151 | CF, 150 ohm |
| R544 | 24366151 | CF, 150 ohm |
| R545 | 24366151 | CF, 150 ohm |
| R551 | 24066955 | VR, 1k ohm, 1/10W |
| R552 | 24066952 | VR, 10k ohm, 1/10W |
| R554 | 24066952 | VR, 10k ohm, 1/10W |
| R555 | 24063673 | VR, 10k ohm, 0.08W |
| R557 | 24061589 | VR, 10k ohm, 1/8W |
| R558 | 24061589 | VR, 10k ohm, 1/8W |
| R559 | 24061589 | VR, 10k ohm, 1/8W |
| R591 | 24383153 | OMF, 15k ohm, 2W |
| R592 | 24383153 | OMF, 15k ohm, 2W |
| R593 | 24383153 | OMF, 15k ohm, 2W |
| R607 | 24366180 | CF, 18 ohm |
| R608 | 24366332 | CF, 3300 ohm |
| R609 | 24553822 | OMF, 8200 ohm, 1W |
| R610 | 24552100 | OMF, 10 ohm, 1/2W |
| R611 | 24552100 | OMF, 10 ohm, 1/2W |
| R613 | 24366274 | CF, 270k ohm |
| R616 | 24532221 | FR, 220 ohm, 1W |
| R621 | 24366102 | CF, 1k ohm |
| R622 | 24366102 | CF, 1k ohm |
| R623 | 24366564 | CF, 560k ohm |
| R624 | 24366152 | CF, 1500 ohm |
| R626 | 24366332 | CF, 3300 ohm |
| R628 | 24366392 | CF, 3900 ohm |
| R629 | 24366392 | CF, 3900 ohm |

| Location No. | Part No. | Description |
|---|---|---|
| R630 | 24366222 | CF, 2200 ohm |
| R632 | 24366102 | CF, 1k ohm |
| R801 | 24007932 | Cement, 6.2 ohm, 10W |
| R811 | 24377224 | CF, 220k ohm, 1W |
| R812 | 24553201 | OMF, 200 ohm, 1W |
| R813 | 24554300 | OMF, 30 ohm, 2W |
| R814 | 24322759 | OMF, 7.5 ohm, 1W |
| R815 | 24366102 | CF, 1k ohm |
| R816 | 24553272 | OMF, 2700 ohm, 1W |
| R822 | 24377224 | CF, 220k ohm, 1W |
| R823 | 24553201 | OMF, 200 ohm, 1W |
| R826 | 24366184 | CF, 180k ohm |
| R829 | 24366102 | CF, 1k ohm |
| R830 | 24532221 | FR, 220 ohm, 1W |
| R831 | 24366334 | CF, 330k ohm |
| R832 | 24366334 | CF, 330k ohm |
| R833 | 24366472 | CF, 4700 ohm |
| R834 | 24553182 | OMF, 1800 ohm, 1W |
| R836 | 24366821 | CF, 820 ohm |
| R837 | 24553680 | OMF, 68 ohm, 1W |
| R838 | 24366221 | CF, 220 ohm |
| R840 | 24532221 | FR, 220 ohm, 1W |
| R890 | 24000918 | PTC Thermistor, 18 ohm, ±20%, 290V |
| R901 | 24946472 | CC, 4700 ohm, ±10%, 1/2W |
| R902 | 24946472 | CC, 4700 ohm, ±10%, 1/2W |
| R903 | 24946472 | CC, 4700 ohm, ±10%, 1/2W |
| R920 | 24000886 | FR, 2.4 ohm, 1W |
| RA02 | 24382223 | OMF, 22k ohm, 1W |
| RA03 | 24366102 | CF, 1k ohm |
| RA05 | 24552620 | OMF, 62 ohm, 1/2W |
| RA06 | 24366563 | CF, 56k ohm |
| RA07 | 24366333 | CF, 33k ohm |
| RA08 | 24366223 | CF, 22k ohm |
| RA28 | 24366393 | CF, 39k ohm |
| RA29 | 24366333 | CF, 33k ohm |
| RA30 | 24366333 | CF, 33k ohm |
| RA31 | 24366333 | CF, 33k ohm |
| RA32 | 24366153 | CF, 15k ohm |
| RA41 | 24366682 | CF, 6800 ohm |
| RA42 | 24366473 | CF, 47k ohm |
| RA43 | 24366682 | CF, 6800 ohm |
| RA44 | 24366473 | CF, 47k ohm |
| RA45 | 24366103 | CF, 10k ohm |
| RA48 | 24366103 | CF, 10k ohm |
| RA49 | 24366124 | CF, 120k ohm |
| RA55 | 24366153 | CF, 15k ohm |
| RA60 | 24366393 | CF, 39k ohm |
| RA61 | 24366153 | CF, 15k ohm |
| RA84 | 24366123 | CF, 12k ohm |
| RA86 | 24366223 | CF, 22k ohm |
| RA87 | 24366472 | CF, 4700 ohm |
| RA88 | 24366563 | CF, 56k ohm |
| RA89 | 24366473 | CF, 47k ohm |
| RA90 | 24366103 | CF, 10k ohm |
| RA91 | 24366472 | CF, 4700 ohm |
| RB01 | 24366103 | CF, 10k ohm |
| RB02 | 24366332 | CF, 3300 ohm |
| RB03 | 24366103 | CF, 10k ohm |
| RB04 | 24366103 | CF, 10k ohm |
| RB05 | 24366332 | CF, 3300 ohm |
| RB06 | 24366473 | CF, 47k ohm |
| RB07 | 24366102 | CF, 1k ohm |
| RB08 | 24366102 | CF, 1k ohm |

| Location No. | Part No. | Description |
|---|---|---|
| RB09 | 24941565 | CC, 5.6M ohm, 1/4W |
| RB10 | 24941565 | CC, 5.6M ohm, 1/4W |
| RB11 | 24941565 | CC, 5.6M ohm, 1/4W |
| RB12 | 24941565 | CC, 5.6M ohm, 1/4W |
| RB13 | 24366153 | CF, 15k ohm |
| RB14 | 24366561 | CF, 560 ohm |
| RB15 | 24366564 | CF, 560k ohm |
| RB16 | 24366563 | CF, 56k ohm |
| RB17 | 24366123 | CF, 12k ohm |
| RB18 | 24366392 | CF, 3900 ohm |
| RB19 | 24366103 | CF, 10k ohm |
| RB21 | 24366563 | CF, 56k ohm |
| RB22 | 24366243 | CF, 24k ohm |
| RB23 | 24366103 | CF, 10k ohm |
| RB24 | 24366102 | CF, 1k ohm |
| RB25 | 24366223 | CF, 22k ohm |
| RB26 | 24366102 | CF, 1k ohm |
| RB27 | 24366562 | CF, 5600 ohm |
| RB30 | 24366471 | CF, 470 ohm |
| RB31 | 24366471 | CF, 470 ohm |
| RB32 | 24366471 | CF, 470 ohm |
| RB33 | 24366471 | CF, 470 ohm |
| RB34 | 24366471 | CF, 470 ohm |
| RB36 | 24366103 | CF, 10k ohm |
| RB37 | 24366102 | CF, 1k ohm |
| RB38 | 24366153 | CF, 15k ohm |
| RB39 | 24366102 | CF, 1k ohm |
| RB40(U902A) | 24366471 | CF, 470 ohm |
| RB40(UA01B) | 24366221 | CF, 220 ohm |
| RB41 | 24366123 | CF, 12k ohm |
| RB42 | 24366103 | CF, 10k ohm |
| RB43 | 24366471 | CF, 470 ohm |
| RB44 | 24366153 | CF, 15k ohm |
| RB45 | 24366104 | CF, 100k ohm |
| RB46(U902A) | 24360101 | CF, 100 ohm, 1/8W |
| RB46(UA01B) | 24366223 | CF, 22k ohm |
| RB47 | 24366271 | CF, 270 ohm |
| RB48 | 24366273 | CF, 27k ohm |
| RR02 | 24366100 | CF, 10 ohm |
| RR03 | 24366222 | CF, 2200 ohm |
| RR04 | 24552470 | OMF, 47 ohm, 1/2W |
| RR06 | 24366562 | CF, 5600 ohm |
| RR11 | 24366471 | CF, 470 ohm |

## COILS & TRANSFORMERS

| | | |
|---|---|---|
| L107 | 23221937 | Coil, Choke, TLN3040 |
| L201 | 23237985 | Coil, Peaking, TRF4150AC |
| L301 | 23237984 | Coil, Peaking, TRF4180AC |
| L302 | 23261974 | Coil (Ferrite Bead), HC5-035 |
| L406 | 23261974 | Coil (Ferrite Bead), HC5-035 |
| L410 | 23221026 | Coil, Choke, AZ9004Y |
| ⚠ L462 | 23227448 | Deflection Yoke, TY14YQOO |
| L501 | 23237981 | Coil, Peaking, TRF4330AC |
| L502 | 23237988 | Coil, Peaking, TRF4829AC |
| L551 | 23232884 | Coil, Variable, TRF3102 |
| L552 | 23250943 | Coil, IF Coil, TRF5426D |
| L621 | 23237986 | Coil, Peaking, TRF4120AC |
| L622 | 23237985 | Coil, Peaking, TRF4150AC |
| L626 | 23237981 | Coil, Peaking, TRF4330AC |
| L811 | 23261959 | Coil, RF Choke, TRF9240 |
| ⚠ L901 | 23200745 | Coil, Degaussing, TSB2129B |
| LA01 | 23237999 | Coil, Peaking, TRF4109AC |
| LB01 | 23262730 | Coil, IF Coil, TRF1120 |
| LR01 | 23232963 | Coil, Variable, TRF3055 |
| LR02 | 23238722 | Coil, Peaking, TRF4822AI |
| ⚠ T401 | 23224983 | Transformer, Horiz. Drive, TLN1039 |
| ⚠ T461 | 23236083 | Transformer, Flyback, TFB4067BD |
| T661 | 23216900 | Speaker, TSP1076, 500kHz, 8 ohm |
| T801 | 23211929 | Line Filter, TRF3130 |
| ⚠ T802 | 23213521 | Transformer, Converter, TPW3064B |
| T803 | 23213707 | Transformer, Converter, TPW3069 |

## SEMICONDUCTORS

| | | |
|---|---|---|
| IC303 | 23119548 | IC, AN5515 |
| IC501 | 23318203 | IC, T51390ASP |
| IC621 | 23318015 | IC, AN5222 |
| ICA01 | 23318376 | IC, M34300N581SP |
| ICR01 | 23119566 | IC, μPC1474HA |
| Q201 | A6317440 | Transistor, 2SC1815-Y |
| Q202 | A6509120 | Transistor, 2SA562TM-O |
| Q211 | A6534040 | Transistor, 2SA1015-Y |
| Q291 | A6534040 | Transistor, 2SA1015-Y |
| Q303B | 23030211 | Screw, 3X14SN |
| Q303C | 23035308 | Screw, BTB3X8SZN |
| Q402 | A6330069 | Transistor, 2SC2482 FA-1 |
| ⚠ Q404 | A6868654 | Transistor, 2SD1426 |
| Q507 | A6363200 | Transistor, 2SC3619 |
| Q508 | A6363200 | Transistor, 2SC3619 |
| Q509 | A6363200 | Transistor, 2SC3619 |
| Q602 | A6325031 | Transistor, 2SC2230-GR |
| Q603 | A6319550 | Transistor, 2SC2073 |
| Q604 | A6532320 | Transistor, 2SA940 |
| Q801 | 23114568 | Transistor (STR), STR5412 |
| Q802 | A6317440 | Transistor, 2SC1815-Y |
| Q804 | A6328333 | Transistor, 2SC2383-Y |
| Q805 | A6357850 | Transistor, 2SC3148 |
| Q806 | A6534040 | Transistor, 2SA1015-Y |
| Q807 | A6532320 | Transistor, 2SA940 |
| QA02 | A6317440 | Transistor, 2SC1815-Y |
| QA13 | A6534040 | Transistor, 2SA1015-Y |
| QA14 | A6534040 | Transistor, 2SA1015-Y |
| QA15 | A6317460 | Transistor, 2SC1815-GR |
| QA16 | A6534040 | Transistor, 2SA1015-Y |
| QA17 | A6534040 | Transistor, 2SA1015-Y |
| QA18 | A6317440 | Transistor, 2SC1815-Y |
| QA19 | A6534040 | Transistor, 2SA1015-Y |
| QB01 | A6317440 | Transistor, 2SC1815-Y |
| QB02 | A6317440 | Transistor, 2SC1815-Y |
| QB03 | A6317440 | Transistor, 2SC1815-Y |
| QB04 | A6534040 | Transistor, 2SA1015-Y |
| QB05 | A6317440 | Transistor, 2SC1815-Y |
| QB10 | A6534040 | Transistor, 2SA1015-Y |
| QB20 | A6317460 | Transistor, 2SC1815-GR |
| D203 | A7150258 | Diode, 1SS176 |
| D242 | A7150351 | Diode, 1SS178 |
| D243 | A7150258 | Diode, 1SS176 |
| D244 | A7150258 | Diode, 1SS176 |
| D246 | A7150258 | Diode, 1SS176 |
| D303 | 23115532 | Diode, ERB12-01RK |
| D309 | A7978850 | Diode, S5295G |
| D315 | A7272143 | Diode, Zener, 1Z75 |
| D401 | A7117215 | Diode, Zener, 04AZ12Y |
| D408 | A7568300 | Diode, 1S1835 |

| Location No. | Part No. | Description |
|---|---|---|
| D416 | A7978850 | Diode, S5295G |
| D447 | A7150258 | Diode, 1SS176 |
| D522 | A7117325 | Diode, Zener, 04AZ13Z |
| D524 | A7117325 | Diode, Zener, 04AZ13Z |
| D528 | A7117325 | Diode, Zener, 04AZ13Z |
| D602 | A7150258 | Diode, 1SS176 |
| D801 | A7568410 | Diode, TVR-4J |
| D802 | A7568410 | Diode, TVR-4J |
| D803 | A7568410 | Diode, TVR-4J |
| D804 | A7568410 | Diode, TVR-4J |
| D806 | 23118339 | Diode, Zener, R2M |
| D807 | 23115530 | Diode, RG2 |
| D808 | A7978850 | Diode, S5295G |
| D809 | A7978850 | Diode, S5295G |
| D811 | A7150258 | Diode, 1SS176 |
| D814 | A7978850 | Diode, S5295G |
| D815 | 23118811 | Diode, Zener, RD4.7EN1 |
| D817 | A7978850 | Diode, S5295G |
| D818 | 23118745 | Diode, Zener, RD39EB2 |
| D819 | A7150258 | Diode, 1SS176 |
| D820 | A7978850 | Diode, S5295G |
| DA07 | A7150258 | Diode, 1SS176 |
| DA11 | A7150258 | Diode, 1SS176 |
| DA12 | A7150258 | Diode, 1SS176 |
| DA13 | A7150258 | Diode, 1SS176 |
| DA14 | A7150258 | Diode, 1SS176 |
| DA15 | A7150258 | Diode, 1SS176 |
| DA16 | A7150258 | Diode, 1SS176 |
| DA21 | A7150258 | Diode, 1SS176 |
| DA22 | A7150258 | Diode, 1SS176 |
| DA53 | 23115922 | Diode, Zener, μPC574J |
| DA54 | A7150258 | Diode, 1SS176 |
| DA55 | A7150258 | Diode, 1SS176 |
| DB03 | A7150258 | Diode, 1SS176 |
| DB04 | A7150258 | Diode, 1SS176 |
| DB05 | A7150258 | Diode, 1SS176 |
| DB12 | A7150258 | Diode, 1SS176 |
| DB13 | A7150258 | Diode, 1SS176 |
| DB15 | A7150258 | Diode, 1SS176 |
| DB44 | A7150258 | Diode, 1SS176 |
| DE55 | A8603140 | Diode (LED), TLR208, Red |
| DR01 | A8652035 | Diode, Photo, TPS703 |

## MISCELLANEOUS

| | | |
|---|---|---|
| ⚠ F801 | 23144129 | Fuse, 2AT |
| F801A | 23165102 | Fuse Holder |
| K902 | 23120517 | Remote Hand Unit, CT-9287 |
| ⚠ P001 | 23142573 | Aerial Terminal, AT945 |
| ⚠ P801 | 23176805 | Power Cord |
| S201 | 23145682 | Switch, Lever, 1C3P |
| ⚠ S801 | 23145583 | Switch, Push, 2C2P |
| SA01 | 23145513 | Switch, Push, 1C1P |
| SA02 | 23145513 | Switch, Push, 1C1P |
| SA03 | 23145513 | Switch, Push, 1C1P |
| SA04 | 23145513 | Switch, Push, 1C1P |
| SA06 | 23145580 | Switch, Push |
| SA07 | 23145580 | Switch, Push |
| SA08 | 23145580 | Switch, Push |
| SA09 | 23145579 | Switch, Push, 2C2P |
| SA09A | 23443133 | Knob, For SA09 |
| ⚠ V901A | 23901867 | Socket, CRT, 8P |
| V901M | 23102983 | Magnet, Purity-Convergence, MAG1008 |

| Location No. | Part No. | Description |
|---|---|---|
| W201 | 23250919 | Coil, Delay Line, TRF2069 |
| W661 | 23151333 | Speaker, SPK1172, 40x70mm, 8 ohm |
| X401 | 23153795 | Ceramic Resonator, 500kHz, TCR1109 |
| X501 | 23153771 | Crystal, 4.433619MHz |
| X502 | 23153798 | 1H-Delay Line, EFDED645A91T |
| Z201 | 23107972 | Ceramic Video Trap, 5.5MHz, TPS5.5MB |
| Z622 | 23107660 | Ceramic Discri, 5.5MHz, TCF1054 |
| Z623 | 23107947 | Ceramic Filter, 5.5MHz, SFE5.5MBF |
| ZB01 | 23153741 | Ceramic Resonator, TCR1029 |

## PC BOARD ASSEMBLIES

| | | |
|---|---|---|
| U902A | 23334133 | Main Board, PW6771-1 |
| U902B | 23334134 | Power-2 Board, PW6771-2 |
| UA01A | 23334135 | Control Board, PW6772-1 |
| UA01B | 23334136 | CRT Drive Board, PW6772-2 |
| UA01C | 23334137 | IR-Amp Board, PW6772-3 |

## PICTURE TUBE

| | | |
|---|---|---|
| ⚠ V901 | A5428239 | Picture Tube, A34JAN30X(W), SVC |

## TUNER

| | | |
|---|---|---|
| H001 | 23121610 | Tuner, VHF/UHF, EG617AV |

MEMO

# SCHEMATIC DIAGRAM 147R7E

**NOTE:** The parts identified by the international hazard symbols are critical for safety. Replace only with part number specified.

### OBSERVATION OF VOLTAGES AND WAVEFORMS

1. Voltages read with VTVM from point shown to chassis ground, line voltage 220 volts, colour bar signal.
2. Voltages reading may vary ±20%.
3. The schematic shown is representative only.
4. All waveforms are taken using a wide band oscilloscope and a low capacity probe.
5. Check FINE TUNING, AGC, BRIGHTNESS, CONTRAST and COLOUR controls for best picture, make sure that CONTRAST and COLOUR controls are in mid position and BRIGHTNESS control is almost in maximum position.
6. Waveforms are taken using a standard colour bar signal.

### NOTES:

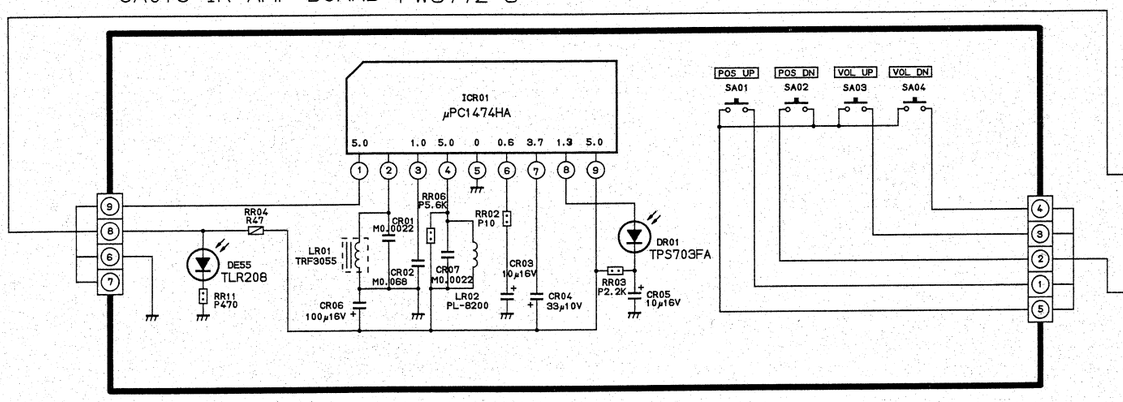
1. The circuits are subject to change without notice.
2. ⊖ : Solder links.

### EXPRESSION

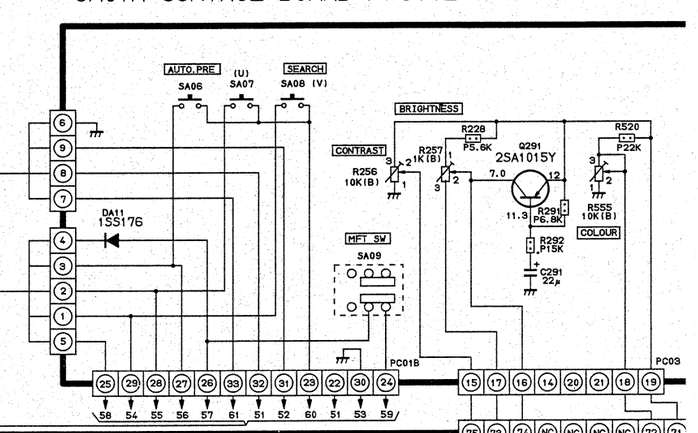
#### VALUE OF RESISTOR, CAPACITOR and INDUCTOR

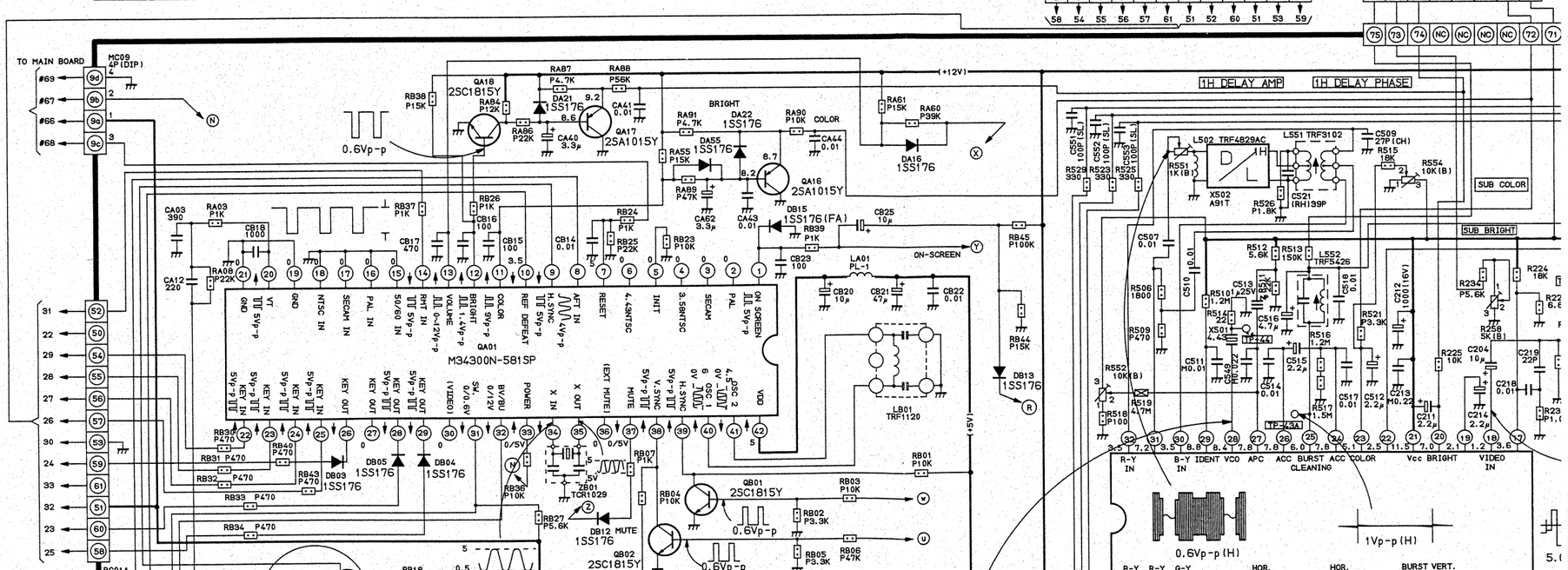
1. Resistance is shown in ohm, k=1,000, M=1,000,000.
2. Unless other wise noted in schematic, all capacitor values less than 1 are expressed in μF and the values more than 1 in pF.
3. Unless otherwise noted in schematic, all inductor values more than 1 are expressed in μH, and the values less than 1 in H.

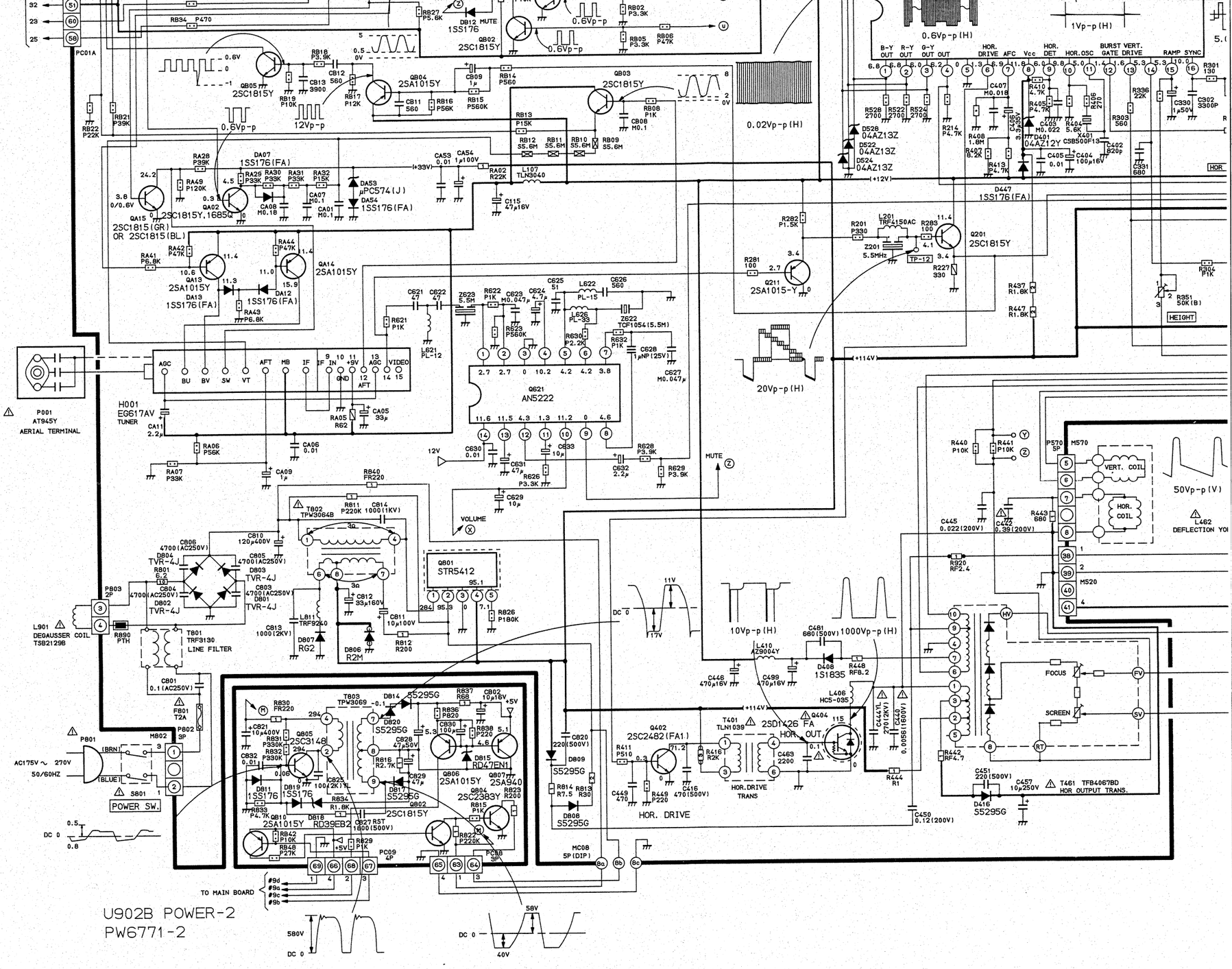
UA01C IR-AMP BOARD PW6772-3




UA01A CONTROL BOARD PW6772-1




U902B POWER-2
PW6771-2
P001
AT945Y
AERIAL TERMINAL
H001
EG617AV
TUNER
AGC
BU
BV
SW
VT
AFT
MB
IF
IF IN
+9V
GND
AFT
AGC
VIDEO
Q621
AN5222
T802
TPW3064B
T801
TRF3130
LINE FILTER
L901
DEGAUSSER COIL
TSB2129B
Q801
STR5412
T803
TPW3069
POWER SW.
AC175V~ 270V
50/60HZ
TO MAIN BOARD
MUTE
VOLUME
VERT. COIL
HOR. COIL
HEIGHT
FOCUS
SCREEN
HOR. DRIVE
HOR. DRIVE TRANS
HOR. OUT
T461 TFB4067BD
HOR OUTPUT TRANS.
L462
DEFLECTION YOK
20Vp-p(H)
50Vp-p(V)
10Vp-p(H)
1000Vp-p(H)
0.6Vp-p(H)
1Vp-p(H)
0.02Vp-p(H)
0.6Vp-p
12Vp-p
580V
58V
40V
+114V
+12V
+33V
MC08
5P(DIP)
PC01A
PC09
4P
PC08
3P

1

ıge without notice.

**CITOR and INDUCTOR**

=1,000, M=1,000,000.
ıematic, all capacitor values less than 1 are expres-
e than 1 in pF.
ematic, all inductor values more than 1 are expres-
han 1 in H.

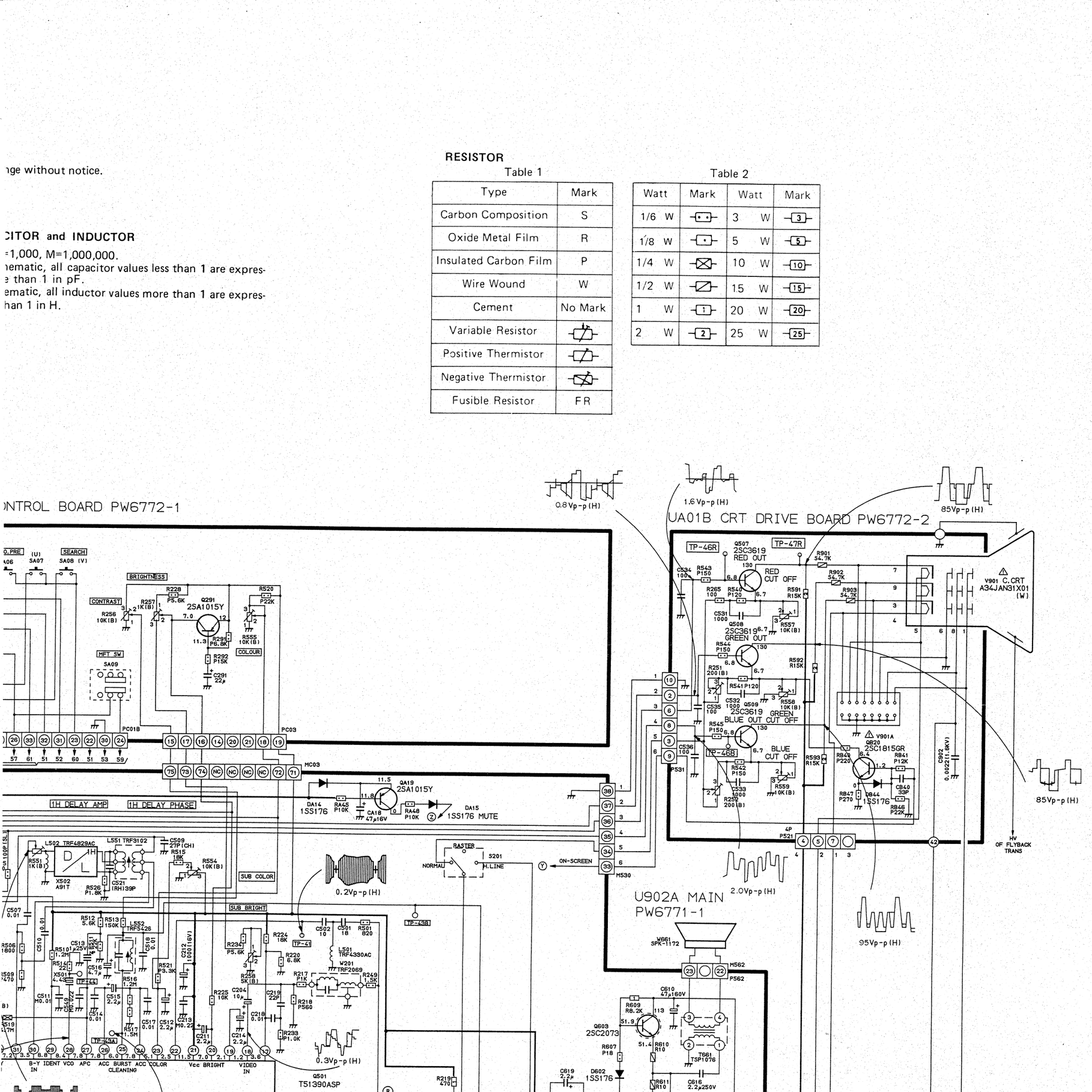
**RESISTOR**

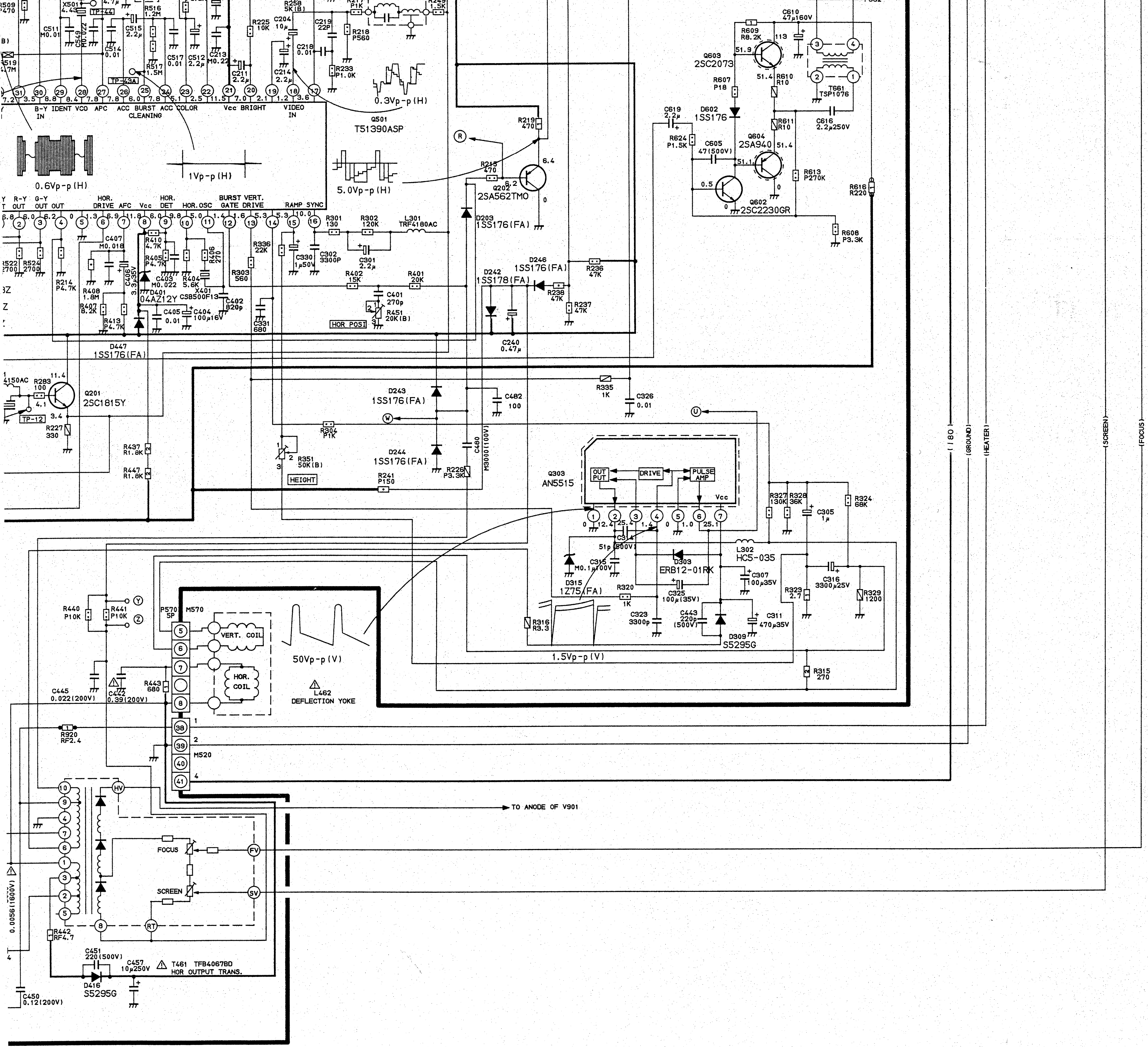
Table 1

| Type | Mark |
|---|---|
| Carbon Composition | S |
| Oxide Metal Film | R |
| Insulated Carbon Film | P |
| Wire Wound | W |
| Cement | No Mark |
| Variable Resistor | |
| Positive Thermistor | |
| Negative Thermistor | |
| Fusible Resistor | FR |

Table 2

| Watt | Mark | Watt | Mark |
|---|---|---|---|
| 1/6 W | | 3 W | 3 |
| 1/8 W | | 5 W | 5 |
| 1/4 W | | 10 W | 10 |
| 1/2 W | | 15 W | 15 |
| 1 W | 1 | 20 W | 20 |
| 2 W | 2 | 25 W | 25 |




Q501
T51390ASP
B-Y IN
IDENT
VCO
APC
ACC
BURST
ACC CLEANING
COLOR
Vcc
BRIGHT
VIDEO IN
0.6Vp-p(H)
1Vp-p(H)
0.3Vp-p(H)
5.0Vp-p(H)
R-Y OUT
G-Y OUT
OUT
HOR. DRIVE
AFC
Vcc
HOR. DET
HOR.OSC
BURST GATE
VERT. DRIVE
RAMP
SYNC
Q202
2SA562TMO
D203
1SS176(FA)
D242
1SS178(FA)
D246
1SS176(FA)
D447
1SS176(FA)
Q201
2SC1815Y
TP-12
TP-44
TP-43A
HOR POSI
HEIGHT
D243
1SS176(FA)
D244
1SS176(FA)
C480
M3000(100V)
Q303
AN5515
OUT PUT
DRIVE
PULSE AMP
Vcc
L302
HC5-035
D303
ERB12-01RK
D315
1Z75(FA)
D309
S5295G
1.5Vp-p(V)
Q603
2SC2073
Q604
2SA940
Q602
2SC2230GR
D602
1SS176
T661
TSP1076
P570
5P
M570
VERT. COIL
HOR. COIL
50Vp-p(V)
L462
DEFLECTION YOKE
M520
TO ANODE OF V901
FOCUS
SCREEN
FV
SV
HV
RT
T461 TFB4067BD
HOR OUTPUT TRANS.
D416
S5295G
(180)
(GROUND)
(HEATER)
(SCREEN)
(FOCUS)

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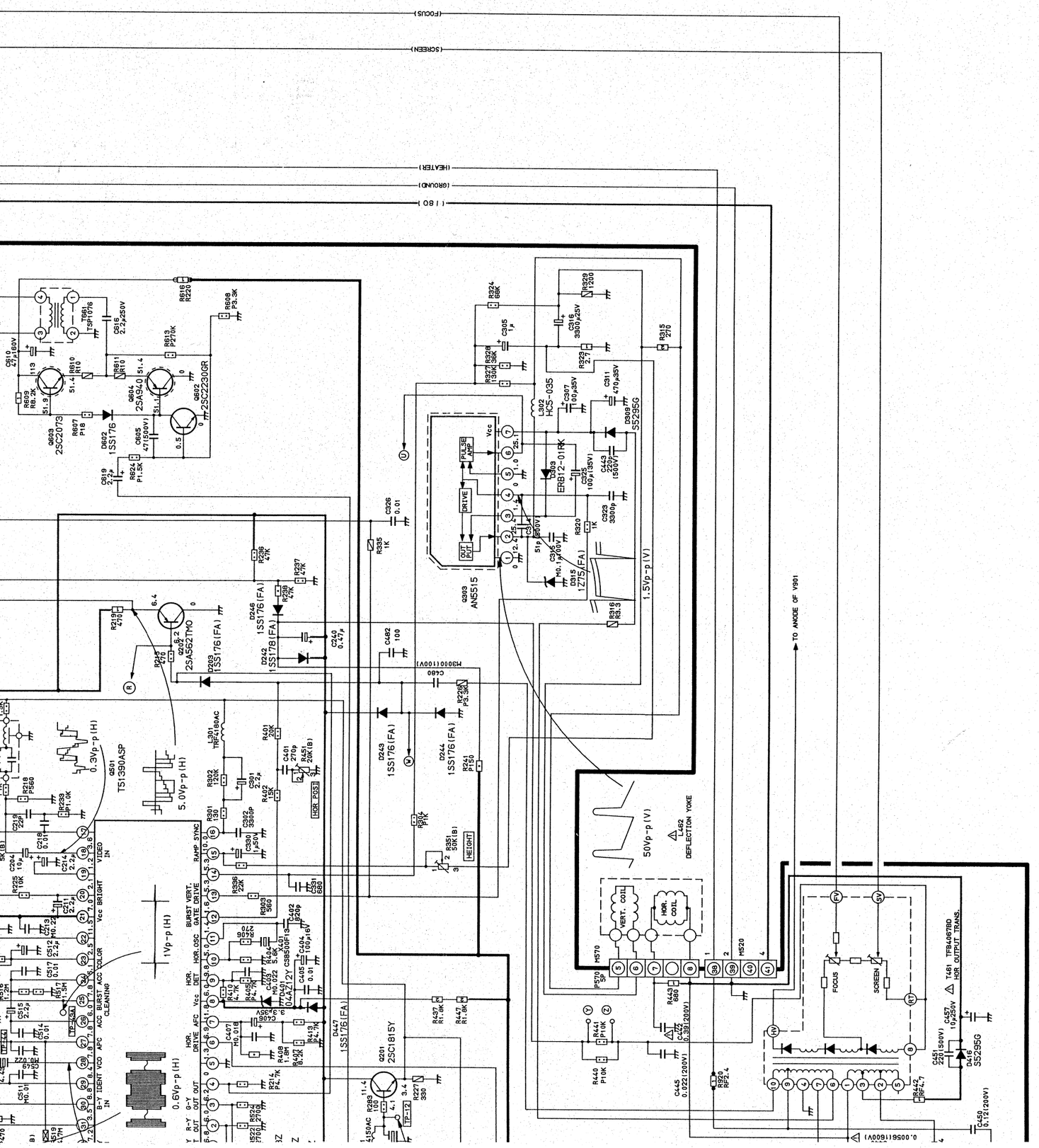
(FOCUS)
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(HEATER)
(GROUND)
(180)
TO ANODE OF V901
1.5Vp-p (V)
50Vp-p (V)
0.3Vp-p (H)
5.0Vp-p (H)
1Vp-p (H)
0.6Vp-p (H)
Q501 TS1390ASP
Q201 2SC1815Y
Q202 2SA562TMO
Q303 AN5515
Q604 2SA940
Q602 2SC2230GR
Q603 2SC2073
D602 1SS176
D605 47(150V)
D619 2.2μ
D246 1SS176(FA)
D242 1SS178(FA)
D303 1SS176(FA)
D243 1SS176(FA)
D244 1SS176(FA)
D447 1SS176(FA)
D309 S5295G
D315 1Z7.5(FA)
D456 S5295G
T601 13P1076
T481 TFB4067BD
HOR. OUTPUT TRANS.
L301 TH2480AC
L302 HC5-035
L482 DEFLECTION YOKE
X401 CSB500P9
HOR. POS.
HEIGHT
VERT. COIL
HOR. COIL
FOCUS
SCREEN
Vcc BRIGHT
VIDEO IN
BURST GATE
VERT DRIVE
RAMP SYNC
HOR.OSC
HOR. DET
HOR DRIVE
AFC OUT
R-Y IN
B-Y IN
IDENT VCO
APC
ACC
ACC COLOR
CLEANING
PULSE AMP
DRIVE
OUT PUT
Vcc
C616 2.2μ250V
C316 3300μ25V
C311 470μ35V
C307 100μ35V
C305 1μ
C309 100μ35V
C443 220p 1500V
C326 0.01
C323 3300p
C345 0.1μ600V
C240 0.47μ
C482 100
C680 M3300(100V)
C218 0.01
C219 22μ
C204 10μ
C214 2.2μ
C211 2.2μ
C213 M0.22
C519 2.2μ
C517 0.01
C511 M0.01
C407 M0.018
C405 0.01
C404 100μ16V
C401 270p
C301 2.2μ
C302 3300p
C303 (250V) 1μ
C231 680
C492 220p
C445 0.022(200V)
C422 0.39(200V)
C451 (50V) 470μ
C457 10μ250V
C450 0.12(200V)
R816 R220
R813 P270K
R811 R610
R609 R8.2K
R607 P18
R624 P1.5K
R698 P3.3K
R335 1K
R320 1K
R236 47K
R237 47K
R238 47K
R218 P560
R233 M1.0K
R225 10K
R336 22K
R303 560
R302 220K
R401 20K
R451 20K(B)
R402 15K
R301 560
R304 P1K
R305 50K(B)
R241 P150
R226 P3.3K
R324 68K
R328 M1.5K
R327 M1.5K
R329 1200
R329 2.7
R315 270
R316 R3.3
R214 P2.7K
R227 330
R283 4.7K
R408 8.2K
R407 8.2K
R413 4.7K
R437 R1.0K
R447 R1.0K
R440 P10K
R441 P10K
R443 680
R442 RF4.7
R520 RF2.4
R522 270Ω
R524 270Ω
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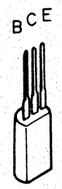
R995 5K(B)
R996 5K(B)
R997 5K(B)
R998 5K(B)
R999 5K(B)
R1000 5K(B)

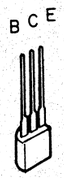
# TERMINAL VIEW OF TRANSISTOR

① 2SA940
2SC2073

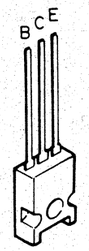
② 2SC2229
2SC2482
2SC2230GR
2SA1020



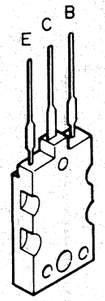

③ 2SA1015-Y
2SC388ATM
2SC1815-Y
2SA562TM




④ 2SC3619

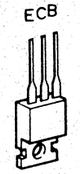



⑤ 2SD1426

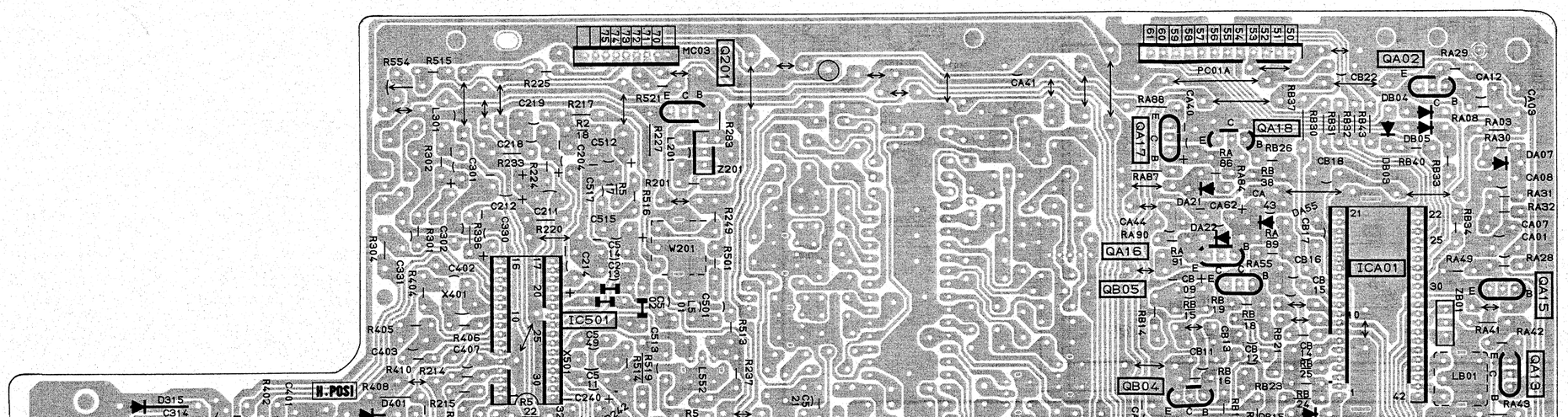


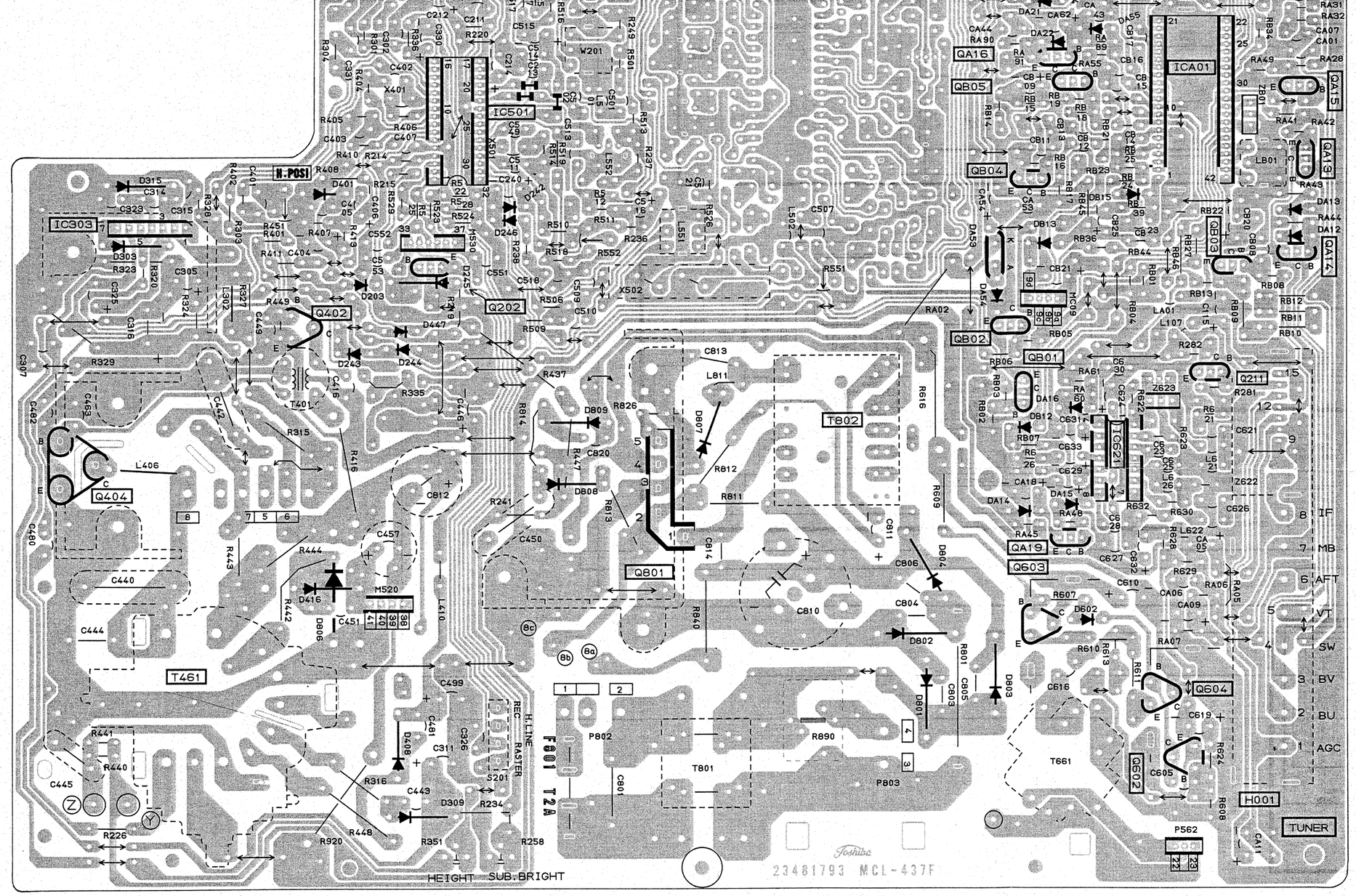

⑥ RN1204
DTC144E

⑦ 2SC1959




## MAIN BOARD PW6711-1
(Foil side)




H.POSI
IC303
IC501
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Q402
Q404
Q801
T401
T461
T802
T801
T661
F601 T2A
HEIGHT
SUB-BRIGHT
H.LINE
REC
RASTER
S201
P802
P803
ICA01
IG621
Q211
QA16
QA15
QA19
QA14
QB05
QB04
QB03
QB02
QB01
Q603
Q604
Q602
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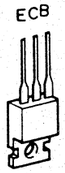
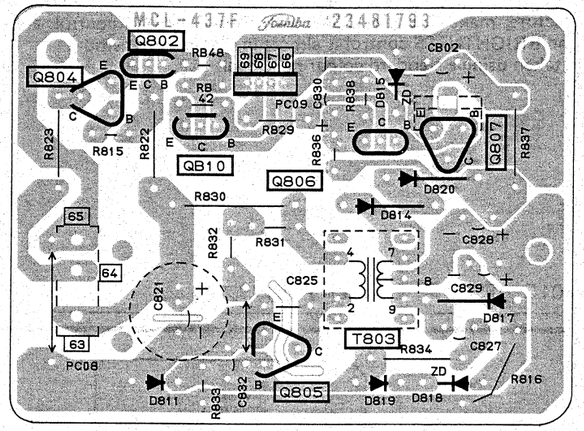
Toshiba
23481793 MCL-437F

⑦ 2SC1959



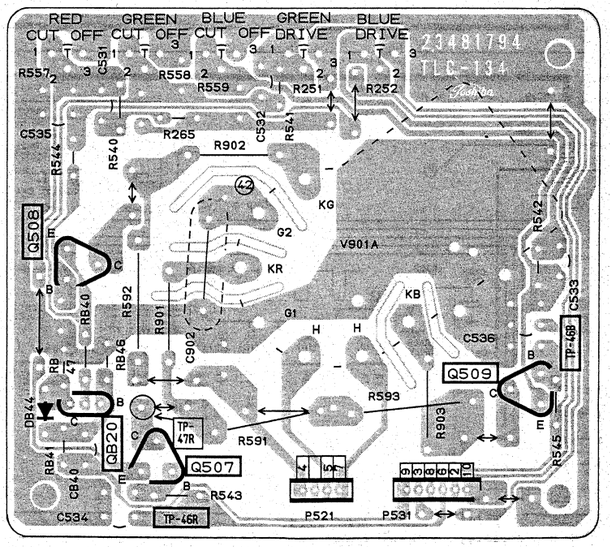

## POWER-2 BOARD PW6711-2

(Foil side)

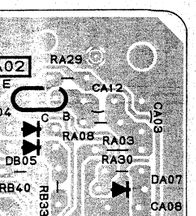


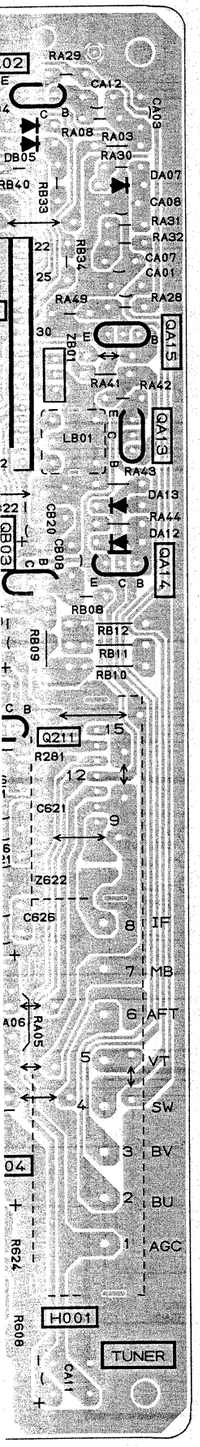

## CRT DRIVE BOARD PW6772-2

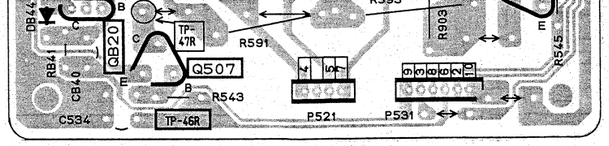
(Foil side)



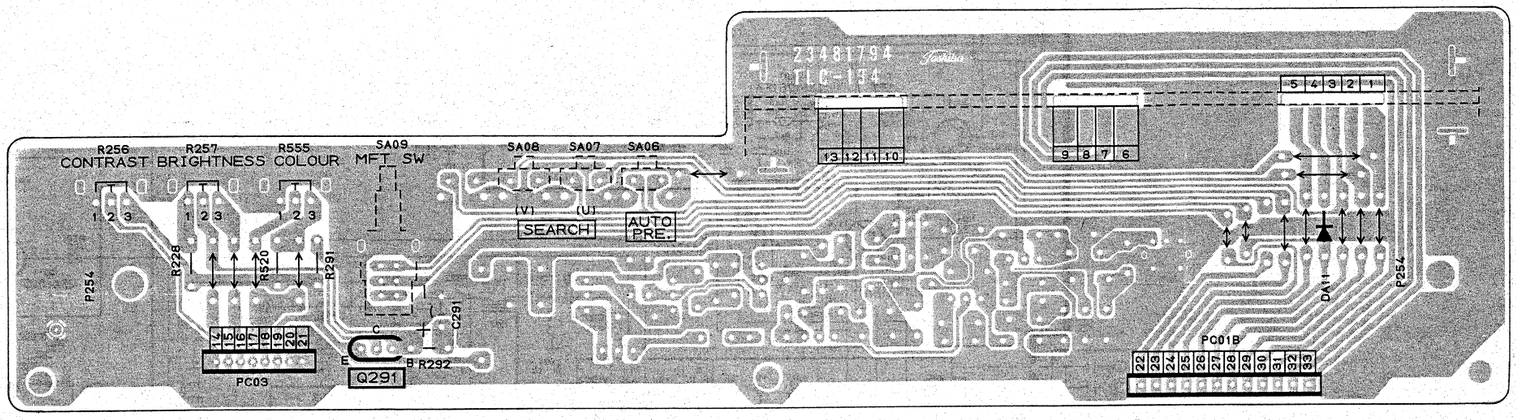

## CONTROL BOARD PW6773-1

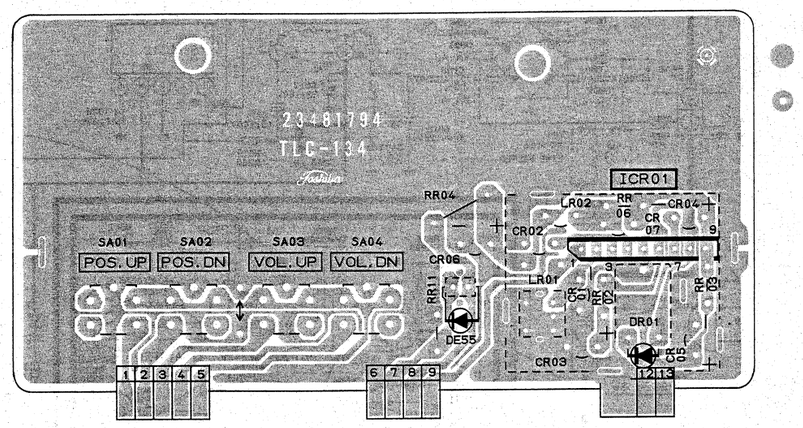





## CONTROL BOARD PW6772-1
(Foil side)




## IR-AMP BOARD PW6772-3
(Foil side)